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ABSTRACT

This set of lessons uses the six essential standards of "Geography for Life" as a basis. At least one lesson is provided for each standard and linked to one or more of the five fundamental themes of geography. At the end of each section is also a special active teaching feature to help students further focus on the concepts presented. The lessons are presented in a standard format with the overview describing the focus of the lesson, objectives to link the standards and the five fundamental themes, estimates of time required, materials and preparation, the procedures for presentation, and suggestions for extension/enrichment activities. Reproducible student handouts follow the teacher material for each lesson. Sections of the book include: (1) Introduction; (2) "The World in Spatial Terms"; (3) "Places and Regions"; (3) "Physical Systems"; (4) "Human Systems"; (5) "Environment and Society"; and (6) "The Uses of Geography." A model unit concludes the book and is entitled "The Colorado River Basin--Past, Present, and Future." (EH)

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ACTIVE GEOGRAPHY:

ENGAGING STUDENTS IN LEARNING ABOUT OUR WORLD

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INTRODUCTION

The "Revolution" in Geographic Education

What happens when the major organizations concerned with geography band together to improve geographic education? If the past 15 years are any indication, a near revolution is the result.

In 1984, after what many prominent geographers considered to be a "half century of neglect" (Hill 1996), a joint committee of the National Council on Geographic Education and the American Association of Geographers produced a document entitled *Guidelines for Geographic Education: Elementary and Secondary Schools* (1984). The *Guidelines* described five fundamental themes in geography, which could serve as the basis for developing a comprehensive K-12 geography program. These themes were:

- Location: Position on the Earth's Surface
- Place: Physical and Human Characteristics
- Relationships within Places: Humans and Environments
- Movement: Humans Interacting on the Earth
- Regions: How They Form and Change

The *Guidelines* might have faded into obscurity, if not oblivion, had not the National Geographic Society decided to underwrite a network of state-based geographic alliances that would help teachers implement the *Guidelines*. The alliances, usually coordinated by academic geographers, offered teacher-training institutes and workshops, developed materials, and in a variety of other ways promoted geographic education. The five themes became bywords among geography teachers nationwide and soon began to appear in geography textbooks and supplementary materials as well.

When the national standards movement was launched in 1991, the results of the work by geography's professional organizations was evident—geography was included as one of the core subjects for which standards would be developed and assessments would be conducted nationally. The American Geographical Society, Association of American Geographers, National Council for Geographic Education, and National Geographic Society received federal funding to develop a set of national standards in geography; that is, to specify what students should know and be able to do in geography in grades K-12.

Many teachers were surprised in 1994, when the standards were published (*Geography for Life* 1994), because the five fundamental themes were not the core of the standards. While the themes' relationship to the standards was evident, the standards project chose to outline the content of geographic education in a set of 18 standards organized into six essential elements. In addition, the standards specified five sets of skills required to be a geographically informed person, skills adapted from those described in the aforementioned *Guidelines*: (1) asking geographic questions, (2) acquiring geographic information, (3) organizing geographic information, (4) analyzing geographic information, and (5) answering geographic questions.

Because the standards differ from the five themes that had formed the core of most of the work in geographic education for ten years, they present new challenges for geography teachers. This book is designed to help teachers in grades 6-10 meet that challenge by providing a variety of geography

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lessons that address the standards and actively involve students in their learning. The standards are briefly presented in the following section. The subsequent section describes how the remainder of this book is organized and provides an overview of the lessons it contains.

Overview of the Standards

The World in Spatial Terms

According to *Geography for Life* (1994), geography is "the study of spatial aspects of human existence." Thus, this first element of being a geographically informed person "captures the essence of the geographic eye: the structuring of geographic information, the ordering of knowledge into mental maps, and the spatial analysis of that information." The concepts and tools embedded in this element provide the building blocks that allow students to develop the more sophisticated understandings contained in the later elements. Without an understanding of location—where things are—and the ability to use such geographic tools as maps and satellite images, for example, students will not be able to understand "the characteristics, distribution, and complexity of Earth's cultural mosaics" (Standard 10).

The standards that comprise this element are as follows:

Standard 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.

As the standard indicates, maps are the preeminent tools of geographers, but geographers also use a wide array of other ways of representing spatial data—globes, aerial and other photographs, satellite images, models, graphs, and charts—all of which geographically literate citizens should be able to read and produce. Using these tools requires understanding the advantages and disadvantages of each so that one can select appropriate methods of representing data and can also critically interpret data presented in various ways.

Standard 2: How to use mental maps to organize information about people, places, and environments in a spatial context.

People carry a great deal of geographic information around in their heads, organized into what geographers call "mental maps." Too often, however, they do not learn how to better organize these mental maps or to use these representations as sources of information for answering geographic questions. Nor are they aware of how perception influences people's mental maps and spatial and environmental decision-making. Addressing this standard involves making students more aware of how to organize and use mental maps that reflect their personal knowledge.

Standard 3: How to analyze the spatial organization of people, places, and environments on earth's surface.

The ability to analyze spatial organization presupposes the ability to describe spatial organization and recognize spatial patterns. According to *Geography for Life*, describing a pattern of spatial organization involves breaking it into four basic components—points, lines, areas, and volumes—while analysis of such a pattern involves looking at such concepts as movement and flow, diffusion, cost of distance, hierarchy, linkage, and accessibility. While these abilities sound quite complex, they are perhaps most readily understood in light of the questions they will help students answer: Why are these phenomena located in these places? How did they get there? Why is this pattern significant?

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Places and Regions

Places and regions are the "basic units of geography" (*Geography for Life*) and, as such, are a critical element of geographic study. According to the *Guidelines for Geographic Education*, "All places on earth have distinctive tangible and intangible characteristics that give them meaning and character and distinguish them from other places." These characteristics are both physical and human; furthermore, people invest places with meanings, the "human intellectual and emotional responses to the place" (Hill and McCormick 1989). All of these aspects of place are important.

In contrast to places, which have "material existence," regions are "mental constructs" (Hill and McCormick 1989), intellectual tools created by humans to organize data about the world in ways that make that data manageable. A region is an area that displays unity in terms of selected criteria, which may be physical or human. Like places, regions evoke emotional responses. As Joel Garreau says in describing the regions he calls the "nine nations of North America," "When you're from one, and you're in it, you know you're home" (Garreau 1981).

Three standards comprise this essential element:

Standard 4: The physical and human characteristics of places.

Physical characteristics of places include landforms, climates, soil, vegetation, and animal life while human characteristics include such features as language, religion, political systems, and population distribution. Neither physical nor human characteristics remain static, but change over time due to both physical processes and the actions of human groups. Increasingly, technology plays a role in how places change. Understanding change processes can help students recognize why decisions about the physical environment are so important. Students should also understand that both personal and community identity spring, in part, from the relationship between people and places.

Standard 5: That people create regions to interpret earth's complexity.

Understanding regions, according to *Geography for Life*, requires "a flexible approach to the world." One place may be part of many overlapping regions defined using different criteria. Geographers define three kinds of regions: (1) formal regions, which are characterized by a common human or physical property—language or landform, for example, (2) functional regions, which are organized around a focal point with "surrounding areas linked to that node by transportation systems, communication systems, or other economic associations," and (3) perceptual regions, which reflect human "feelings and attitudes about areas," often based on stereotypes. Like places, regions change and are interconnected.

Standard 6: How culture and experience influence people's perception of places and regions.

Different people see places and regions differently. Such personal characteristics as age, gender, cultural background, and experience shape the ways in which people view places and regions. Particular places serve as cultural symbols for given groups of people. Like physical characteristics of places, humans' perceptions of places can change over time; such changes in perception may reflect cultural changes or the influence of technology. Understanding why people have differing views of places and why places and regions serve as symbols for individuals and cultures can help students avoid ethnocentric conclusions about other people and places.

Physical Systems

This essential element, along with Human Systems, covers the "specific content of geography." According to *Geography for Life*, physical systems "looks at physical processes (climate, landforms,

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etc.) and then organizes these processes into functional units, ecosystems." Understanding physical processes and ecosystems is necessary in order to understand how humans live on the earth.

Two standards comprise this essential element:

Standard 7: The physical processes that shape the patterns of earth's surface.

Physical processes shape patterns in the physical environment. Because humans are dependent on the physical environment, geographically informed people must understand how that environment is formed. *Geography for Life* organizes the physical processes students should study in relation to this standard into four categories: "those operating in the atmosphere (i.e., climate and meteorology), those operating in the lithosphere (e.g., plate tectonics, erosion, and soil formation), those operating in the hydrosphere (e.g., the circulation of the oceans and the hydrologic cycle), and those operating in the biosphere (e.g., plant and animal communities and ecosystems)." As students learn about these processes, their interactions, and their influence on the environment in different regions of the earth, they also should learn how to predict consequences of physical processes in the future.

Standard 8: The characteristics and spatial distribution of ecosystems on earth's surface.

An ecosystem is the interaction of a community—the populations of plants and animals that live and interact together—with the other three components of the physical environment—the atmosphere, hydrosphere, and lithosphere. In addressing this standard, students learn about such things as the local and global patterns of ecosystems, how ecosystems work, how physical processes produce changes in ecosystems, how human activities influence changes in ecosystems, and the importance of ecosystems in people's understanding of environmental issues. As Hill (1996) summarizes the importance of this standard, "Understanding the nature and distribution of ecosystems and the influences of physical processes throughout the environment is crucial to understanding the role of humans within the physical world."

Human Systems

Since geography is the study of how humans live on earth, this element is obviously of critical importance. It deals not only with human population but also with human activities, such as migration, settlement, conflict and cooperation, culture, and political and economic systems. In geography, the study of all of these areas is linked to the spatial perspective.

Five standards comprise this essential element:

Standard 9: The characteristics, distribution, and migration of human populations on earth's surface.

According to *Geography for Life*, "the growth, distribution, and movements of people on earth's surface are the driving forces behind not only human events—social, cultural, political, and economic—but also certain physical events—large-scale flooding, resource depletion, and ecological breakdown." Thus, understanding how population is distributed, the reasons for differences in population density, population growth rates, and patterns of migration (both historically and contemporarily) are critical to being a geographically informed person.

Standard 10: The characteristics, distribution, and complexity of earth's cultural mosaics.

This standard describes an exceptionally rich area of study, the concept of culture, which "defines every human society because it encompasses identity, purpose, place, and vision....Culture is a force that can both unify and impede connections and communication among peoples" (Hill 1996). Understanding this standard involves knowing where certain cultures are located, how cultures converge and

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diverge, and how cultural characteristics are diffused. As students learn about how culture influences ways of life and the characteristics of a region, they should also learn to "read" the landscape as an indicator of the culture of the humans who live there.

Standard 11: The patterns and networks of economic interdependence on earth's surface.

This standard is also dense with meaning, as it incorporates an understanding of economics. Thus, to understand it, students must understand the different kinds of economic activities, the reasons for the spatial distribution of these activities, and how they are affected by changes in technology, transportation, and communication. They must also develop understanding of the notions of interdependence and systems and see how the nations of the world are becoming more economically interdependent.

Standard 12: The processes, patterns, and functions of human settlement.

As the authors of *Geography for Life* explain, "People seldom live in isolation." Settlements are therefore an important aspect of how people live on earth. Today, urban settlements are of increasing importance, in both the developed and developing worlds. Thus, students should develop a general understanding of spatial patterns of settlement as well as of the purposes and functions of settlements. They should also, however, learn more specifically about cities—why cities have developed, the consequences of urbanization, and the internal structure of cities and how those structures change.

Standard 13: How the forces of cooperation and conflict among people influence the division and control of earth's surface.

People divide earth's surface into various kinds of spaces. As explained by Hill (1996), "Political spaces...may be as small as the school attendance area or as large as an alliance among nations. Economic space includes a firm's marketing regions and international trading blocs. Social and cultural spaces range from households to the administrative regions of world religions." All of these divisions of space are influenced by cooperation and conflict among people. These multiple divisions of space also influence people's lives. Thus, understanding the ways in which space is divided for purposes of control and the factors that influence the divisions is an element of being a geographically informed person.

Environment and Society

In this essential element, students reintegrate what they have learned about places and regions, physical and human systems, to look at "the interaction between physical and human systems and...the central role of resources in environment-society links" (*Geography for Life* 1994). This element closely parallels the fundamental theme of relationships within places, which emphasized three aspects of the interactions between humans and the environment: how people depend on the environment, how people adapt to the environment, and how people change the environment. Technology is especially important to the last aspect of human/environment relationships, since increasing levels of technological development tend to result in larger changes to the environment. Technology also affects the use of resources and is thus key to this element.

Three standards comprise this essential element:

Standard 14: How human actions modify the physical environment.

The importance of this standard is capsulized in this statement from *Geography for Life*: "Many of the important issues facing modern society are the consequences—intended and unintended, positive and negative—of human modifications of the physical environment." Thus, it is critical that students understand not only how humans change the environment but how those changes affect the environment not only locally but in other areas as well. They should also understand the role of technology—

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in human modification of the environment and in the capacity of the physical environment to accommodate those modifications.

Standard 15: How physical systems affect human systems.

People obviously depend on the environment—for food, building materials, water, air, and on and on. While the highly technological nature of contemporary society may suggest that people are less dependent on the environment than they once were, this is an illusion. As Hill and McCormick (1989) point out, "each intervention we make with nature comes with a cost and, rather than eliminating environmental limits, imposes a new set of conditions." The world's environments are widely different, with some being more easily settled by humans than others. The process of solving environmental barriers to settlement is called adaptation and is a key to understanding this standard. Natural hazards—and how humans perceive and react to them—are also a component of physical systems' influence on human systems.

Standard 16: The changes that occur in the meaning, use, distribution, and importance of resources.

As Hill (1996) points out, "The concept of resources has changed over time. Initially, when populations were smaller, resources were assumed to exist in abundance and were available for almost limitless use. The concept of nonrenewable resources did not evolve until some resources appeared to be in short supply. Unwise resource use can negatively affect the environment and quality of life." Today students should understand where various resources are found, how they are used, and why different people have different views about the use of resources. They should also know how availability of resources influences human settlement and how human policies and actions regarding resources affect physical systems. The standards place particular emphasis on energy resources and on the interactions between technology and resources.

The Uses of Geography

A question that students frequently raise about all aspects of the social studies curriculum is "How is knowing this going to help me?" This essential element addresses that question, looking at how "geography, taken as a whole, enables us to understand the past, interpret the present, and plan for the future" (*Geography for Life* 1994). Given the problems humans face that are directly related to such geographic topics as population and its impact on the environment, understanding how to use geographic information is critical to determining how humans will live on earth in the future.

Two standards comprise this essential element:

Standard 17: How to apply geography to interpret the past.

Throughout the previous standards, change—in spatial organization, in places and people's perceptions of them, and so on—has been a recurring theme. In this standard, those strands are drawn together to look at change specifically, as well as to examine how geographic contexts have influenced past events. As Hill (1996) writes, "Everything happens in time and space. A thorough interpretation of the past must, therefore, include the geographic context: Where did the event occur? In what kind of human and physical environment did it happen? How was the event related to events in other places? What resources and technologies did people have? How did they move from place to place? What environmental constraints did they face?" These questions provide a framework for interpreting the past through a geographic lens.

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Standard 18: How to apply geography to interpret the present and plan for the future.

Preparing young people for citizenship is a primary goal of the social studies curriculum. Thus, this standard brings geography to bear on a major purpose of social studies, since achieving it allows young people to use their geographic knowledge to plan for the future. To do so, students must be able to recognize varying points of view on geographic issues, to understand how these varying points of view influence policy formation, and to use geographic thinking to solve problems, both personal and societal.

Organization of This Book

This introduction is followed by six sections, paralleling the six essential elements defined in *Geography for Life*. At least one lesson is provided for each standard. To assist those teachers for whom the five fundamental themes have become an integral part of their teaching, each lesson is also linked to one or more themes. Following these six sections, we present a model unit that addresses standards from several of the essential elements.

A number of the lessons in this book were submitted by teachers who developed the lessons for use in their own classrooms; other lessons were developed specifically for inclusion in this collection. Still others were reproduced, with permission from other sources. These sources generally contain many more excellent lessons addressing the standards; if you like a lesson, we recommend that you check the source for additional teaching ideas.

The lessons are presented in a standard format. An **Overview** describes the focus of the lesson, as well as the instructional activities used to help students construct their understanding. Content, skill, and attitude **Objectives** are then presented, along with links to the standards and the five fundamental themes. For planning purposes, the lessons give an estimate of the **Time Required** to use the lesson (on the basis of standard 45- or 50-minute class periods) and describe the **Materials and Preparation** required to use the lesson. Step-by-step **Procedures** for teaching the lesson are followed by suggestions for **Extension/Enrichment** activities. Reproducible student handouts follow the teacher's material for each lesson.

Because we believe that the most meaningful learning occurs when students are actively involved and have opportunities to construct meaning based on their experiences, both in and out of class, the lessons draw on a wide range of teaching strategies. Some of these strategies may be less familiar than others and may require greater preparation. Consequently, throughout the book, we have included several **Special Active Teaching Features**. Each such feature provides a brief "how-to-do-it" on an interactive teaching strategy; the strategies covered are using maps and globes, using literature, field studies, simulations, using the Internet/World Wide Web, and service learning. If you have not tried all of these strategies previously, we hope you will find in these sections the support and encouragement you need to give one or more new approaches a try.

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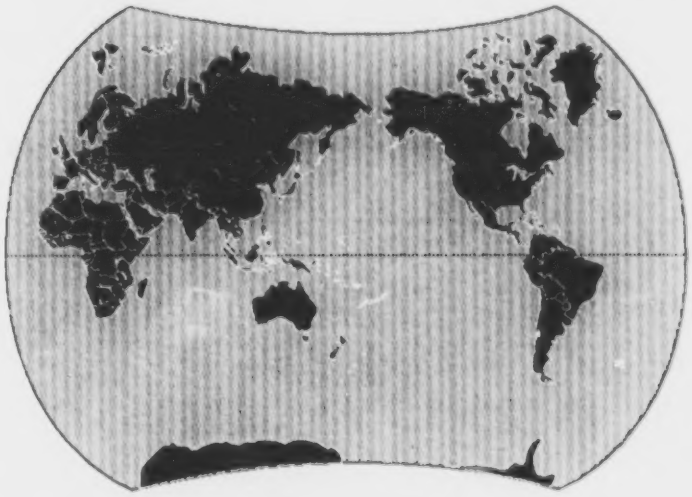
THE WORLD

IN SPATIAL TERMS



1. Presenting Geographic Data

Overview:

Maps and globes are among the most critical tools of geographers, but geographers also use a range of other means of displaying the data they collect. Each tool has particular strengths in terms of the kinds of analysis it facilitates. In this lesson, students gather and display geographic data on nations assigned by the teacher; they analyze the displays created to determine which make most effective use of such tools as bar graphs, circle graphs, line graphs, and various types of special-purpose maps. This lesson can be used in studying any world region.

Objectives: At the end of this lesson, students will be able to:

1. Describe various ways in which geographic data can be displayed.
2. Cite the strengths of various ways of presenting data.
3. Create and evaluate data displays.

Standard Addressed: 1

Theme Addressed: Location

Time Required: 3 class periods plus homework time

Materials and Preparation: You will need to decide what countries you want students to research. We recommend selecting at least five countries in the same region; choosing more than 10 countries might make the presentation of data too complex for some students. You will need copies of Handouts 1-1 and 1-2 as well as a selection of maps and graphs of various types (from such sources as *USA Today* and *National Geographic*) and materials for making posters and outline maps of the region in which the countries being studied are located. You will need to ensure that resource materials are available for student research—either print or online resources can be used.

Procedure:

1. Remind students that geographers use a variety of different kinds of tools to display the data they collect. These include maps and globes; line, bar, and circle graphs; various kinds of charts; and data bases. In this lesson, students are going to be using some of these tools and analyzing the particular strengths of the tools they use.

2. Distribute the interesting maps and graphs you have collected so that each pair of students has a different one. Give each pair a copy of Handout 1-1 as well. Allow time for students to analyze their items and complete the handout. While they are doing this work, write headings on the chalkboard for

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the two lists of criteria students are to create: "Effective Data Displays" and "Attractive Data Displays."

3. When students have completed posting their statements, conduct a brief class discussion of their findings.

4. Tell students that they are going to collect their own data and decide how best to display it. Divide the class into as many groups as you have countries to research and distribute Handout 1-2. Go over the directions with students to ensure that they understand the assignment and make them aware of the poster-making materials and resource materials you are making available to them. Set a date for completion of the posters.

5. When students have completed their work, display the posters around the room. Allow time for students to examine other groups' work and then conduct a class discussion of the effectiveness and attractiveness of the displays, using the criteria generated by students earlier in the lesson. Add to or modify the criteria based on this discussion.

6. Next, tell students that they are going to be creating some ways of displaying data comparing the countries researched. This time, assign each group one set of data (religions, literacy, type of government, age structure, etc.) and ask them to create a data display that compares the countries studied on this dimension. Allow time for students to complete this work.

7. When students have completed their work, display it around the classroom and conduct a class discussion of what these comparisons show, as well as of the effectiveness and attractiveness of the displays. Did students have any difficulty in terms of the comparability of the data? How did they decide what type of display to use?

8. Debrief the entire lesson by asking students to reflect on what the experience taught them about the effectiveness of various types of data displays. For example, they may have learned that a line graph is a good way to show change over time while a circle graph is a good way of displaying percentages of a whole.

Extension/Enrichment:

Challenge students to analyze the graphs, charts, and maps they see in the newspaper. Are they effective? Do they confuse the reader in any way? Are the most attractive data displays always the most effective? Why or why not?

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ANALYZING DATA DISPLAYS

Analyze the chart, graph, map, or other type of data display that your teacher has given you. Give the item two ratings, using the following scale for both ratings:

1 = excellent
2 = good
3 = average
4 = fair
5 = poor

Effectiveness Rating: _____

Reason for Rating: _____

Attractiveness Rating: _____

Reason for Rating: _____

Based on your analysis, develop a criterion—a standard—for creating effective data displays and another criterion for creating attractive data displays. A criterion might be a statement about what a particular kind of data display is well-suited to show or poorly suited to show. It might also be a rule for choosing colors or other visual features. Here are two examples:

Do not use a line graph to compare percentages of the whole.

Use colors that contrast but look good together.

Write your criteria on the chalkboard under the appropriate headings.

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GATHERING AND DISPLAYING DATA

Your assignment is to gather data about the country of _____ and to create a poster displaying that data. Your poster should include at least four different ways of displaying data. Some examples are a map, a chart or table, a line graph, a bar graph, a circle graph, a pictogram, or text.

Gather the following data about your country:

Population:_____

Population Density:_____

Age Structure of Population:_____

_____

_____

Birth Rate:_____

Death Rate:_____

Life Expectancy for Males and Females:_____

_____

Major Religions Practiced:_____

_____

Literacy Rates for Males and Females:_____

_____

Type of Government:_____

_____

You may use online data resources (a good starting point can be found at http://www.odci.gov/cia/publications/nsolo/factbooks/global.htm) or print resources (an almanac or comprehensive world atlas would be a good starting point). Be sure to note your sources somewhere on your poster.

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2. A Sense of Place: Mental Maps of Your Community

Overview:

Mental mapping is based on the premise that a map drawn from memory constitutes a vision of reality even if it is not accurate. Freehand maps drawn by students offer a graphically rich database for beginning a study of their community and region.

This activity involves students in thinking about the distinctive natural and human-made features of the community in which they live through a mapping exercise. By comparing their individual and collective mental maps, they will come to understand what it is about their community that provides a sense of place.

Objectives: At the end of this lesson, students will be able to:

1. Draw/sketch maps from memory and analyze them.
2. Explain what makes certain landmarks important at the personal and community levels.
3. Analyze selected landmarks to determine how they provide a sense of place.

Standards Addressed: 2, 4, 6

Themes Addressed: Location, Place, Regions

Time Required: 1-2 class periods

Materials and Preparation: You will need copies of Handout 2-1 for all students, as well as markers, newsprint, and crayons. You may wish to invite someone from the local historical society or neighborhood association to hear the student reports and ask questions.

Procedure:

1. Provide students with copies of Handout 2-1. Discuss the value and process of mental mapping (geographers are interested in the maps people carry around in their heads because they provide important information about people's perception and experience in their community). Be sure students understand the vocabulary used on the handout. Have students work in groups of three to construct maps following the instructions on the handout. Emphasize that they can only report on *three* places. This forces them to discuss what's really important. If students come from different neighborhoods, you may wish to group them accordingly.

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2. As each group presents its map, ask questions to probe the reasons they selected the landmarks that they did. Post maps following the presentation.

3. Once the individual presentations have been made, ask students to identify the common strands in the maps.

- Do the maps contain more natural or humanmade features?
- What issues are represented on more than a few maps?
- What landmarks are the most positive features of the community? What makes them so?
- Do the maps tell about the ideals or the realities of our community, state, and region?
- What cultural traditions are reflected in the maps?

4. Next, focus on the differences apparent in the maps. What do these differences suggest about the perceptions students have about the community?

5. Write the following question on the chalkboard and ask students to respond to it in their journals or notebooks. The writing could be done in class or as homework.

> Pick two places in our community. Why are they important to you personally? to our community?

6. Save the maps. At the end of your unit on the community, ask students to revise their maps to show how they view the community differently as a result of their studies.

Extension/Enrichment:

A similar process could be used at the beginning of units on world regions. In discussing mental maps of these regions, particular attention should be given to the sources of students' information and to why certain places tend to be represented on most students' maps while others are consistently omitted.

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MAPPING YOUR COMMUNITY

Suppose that an exchange student and his/her teacher wanted to visit your community to learn what it's like to live in the region.

As a team, create a mental map that will inform them about the community in which you live. Your map should feature three places that will be most useful in helping others *understand* your region as it is reflected through your community. You will have about 20 minutes to design and produce the map and 3 minutes to present it to the class.

Use lines, symbols, color, words, and pictures to tell us about your community...

- Who lives in your community.
- How people live in your community.
- Your community's traditions.
- Stories about your community that make a point about values and beliefs.
- Landscape and resources of your community.
- Trends/issues shaping the future of your community.

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3. Geographic Links: Where and Why

Overview:

One aspect of being able to analyze the spatial organization of people, places, and environments on earth's surface is recognizing the relationships between places. This lesson literally begins developing that understanding at home, asking students to keep a log of the places to which their home is linked. Class members pool their data and develop generalizations about factors that influence the frequency of interactions between places. They then conduct a survey to test such a generalization developed by geographers.

Objectives: At the end of this lesson, students will be able to:

1. Develop a strategy for gathering data about linkages between places.

2. Analyze data about linkages between places and develop generalizations based on their analysis.

3. Explain the relationship between distance, accessibility, and frequency of interaction among places.

Standards Addressed: 1, 3

Theme Addressed: Movement

Time Required: 2-1/2 class periods, with a week between the first half period and the second period and one or two days between the second two class periods.

Materials and Preparation: You will need multiple copies of Handouts 3-1 and 3-2 unless you plan to have students develop their own data collection instruments. A supply of posting paper and markers would be useful, as would a large map of your local vicinity.

Procedure:

1. Inform students that they are going to be looking at relationships between places over the next two weeks. Ask them to make a large circle in the center of a sheet of paper and label it "Home." Around this circle, they should place smaller circles and label them with places they visit on a regular basis. They should connect the inner circle to the outer circles with lines of variable thickness, with thicker lines representing more frequent visits and thin lines representing infrequent visits.

2. When students have completed these webs, conduct a class discussion of what they reveal. What places are strongly related to their homes? Why? Are there places they would like to visit more often but are unable to? What factors keep them from visiting these places? How might the webs be different if links were shown for everyone who lives in their home?

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3. Tell students that for the next week they are going to be collecting data on links between their homes and other places. They will need to ask all of the people who live in their homes for assistance. Distribute Handout 3-1 and go over the directions with students. Tell students they can get additional sheets if they need them.

4. When students have collected their data, form small groups in which students can analyze and discuss their data. First ask them to focus on the places that are visited most frequently by members of their households. Why are these places visited so often? Then have them shift their attention to places visited less frequently. What factors contribute to the less frequent contact?

5. Write the following terms on the chalkboard: *need*, *distance*, *accessibility*. Ask each group to develop one general statement using each term. The statements should be based upon the data collected by group members. Of course, students may create additional generalizations if they are able. It may be helpful to give an example: People visit places that help them meet basic human needs more often than places that help them satisfy their wants.

6. Have groups write their generalizations on posting paper with markers and hang the papers around the room where they can be seen by classmates.

7. Conduct a class discussion comparing the generalizations. What generalizations were supported by the data in all the groups? What differences emerged? What might explain these differences? If we considered links that did not involve direct visits, such as telephone contact, e-mail, etc., how might our data change?

8. Tell students that geographers do exactly what they have been doing—create generalizations based on data. One of the generalizations that geographers have developed is called the "law of retail gravitation." Allow time for students to speculate on what this law might say. Then explain the law, which states that the number of times a person will visit a shopping center is inversely proportional to the distance between his/her home and the center and proportional to the size of the center. In other words, people are more likely to visit big centers than small centers and less likely to visit centers that are far from their homes. Challenge students to come up with a way to test this hypothesis. Students are likely to come up with the idea of a survey. While there may be many ways to structure the survey, the most manageable survey may be one that asks residents of a specific area how often in a given time period they have visited four shopping centers—one small and nearby, one larger and nearby, one smaller and farther away, and one larger and farther away. Handout 3-2 can be used to conduct such a survey, but you may want to have students develop their own data collection forms. Assign each student to conduct a certain number of interviews (you may want to specify whether the interviewees are to be adults or young people) and establish a due date. You may want to review survey etiquette (politely ask people if they want to be interviewed, briefly explaining your purpose; do not argue with people who say no; thank those who say yes, etc.).

9. When students have completed the survey, have them pool their data and decide on an appropriate way to display it in a chart or graph. Conduct a class discussion of whether the data they collected supported the law of retail gravitation. Did students discover other factors besides size and distance that affected the frequency of visits?

10. Conclude the lesson with a discussion of why information such as the information students gathered might be important. For example, someone starting a new business could find such information useful in deciding where to locate the business, city planners could find it useful in planning roads, and so on.

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Extension/Enrichment:

1. Have students experiment with ways of mapping the information they collected in this lesson. What would be the advantages of mapping this data? The disadvantages? What do students think is the best way to display the data?

2. Have students develop and implement methods for testing some of the generalizations they developed regarding relationships between places.

3. Ask a city planner to visit the class and discuss with students the generalizations about relationships between places that he/she relies on when making decisions.

4. Ask students to explore further how technology affects relationships among places. What advantages does the telephone have over direct visits? What limits does the telephone place on relationships? How is e-mail contact different from telephone contact? Are the relationships between places different if the links are made through different technologies? Why or why not?

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LINKS BETWEEN YOUR HOME AND OTHER PLACES

You are going to collect data about the visits to other places that people in your household make during one week. You will record the data in the chart below. You will need the help of everyone who lives in your home to complete this activity accurately. You may want to have a family meeting to discuss this assignment and/or provide a log for each individual.

When you have finished collecting your data, study the data so that you will be able to discuss what it shows with your classmates. You may want to think about the importance of need, distance, and accessibility.

Site Visited	Number of Visits (use tick marks)	Approximate Distance From Home	Reason for Visit

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TESTING A GENERALIZATION: A SURVEY

1. What is your name?_____

2. Into what range does your age fall:

   10-25

   26-40

   41-55

   56-70

   71 +

3. Where do you live?_____

4. How many times in the past six months have you visited the following shopping centers:

   1._____ Never 1-3 times 4-6 times 7 or more

   2._____ Never 1-3 times 4-6 times 7 or more

   3._____ Never 1-3 times 4-6 times 7 or more

   4._____ Never 1-3 times 4-6 times 7 or more

5. For the shopping center you visited most, what was the main reason you visited it most often?

6. For the shopping center you visited least, what was the main reason you visited it least often?

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Active Teaching: Using Maps

Among geographers' many tools, perhaps the most critical are maps. Geographers not only gather information from maps, they also use maps to convey information to others. To become geographically informed citizens, students should become skilled users of maps, able not only to gain information from maps but to evaluate and interpret that information as well. While students need not become cartographers, they should also develop the ability to convey information through maps.

Maps can be exciting—one need only witness a class of students working with a collection of visually appealing maps like *The New State of the World Atlas* to recognize the truth of that statement. Teachers may, however, need to go beyond the standard maps provided on copy masters or in textbooks for students to begin seeing how much fun working with maps can be. In addition, students must know ***how*** to work with maps to enjoy them; if they lack the skills necessary to read maps, students will find working with them as frustrating as reading a text that is beyond their abilities.

Creating maps can also be exciting, especially if students understand that maps cannot only convey information, they can be beautiful and/or entertaining as well. While use of maps is common in geography classes, creation of maps seems to be a less frequently used strategy; many teachers do not seem to go beyond having students label locations and color in outline maps. In introducing students to the craft of cartography and the tools cartographers use, we have found that most students have never really thought about how maps are made. When given the opportunity, they thoroughly enjoy the chance to work with the cartographers' tools and create their own maps.

As a geography teacher, you have undoubtedly worked with maps in a variety of ways. Our intent in this section is simply to provide some tips and reminders that may stimulate your own thinking about the use of maps in the classroom. First we talk about assessing students' skills so you will know what they can and cannot do with respect to maps. Then we describe a framework for reading/making maps. Finally, we provide some suggestions for helping students learn to enjoy using maps.

Diagnosing

Unfortunately, no matter what grade level you teach, you cannot assume that your students enter your class with sophisticated map-reading or mapping skills. Thus, doing some diagnostic assessment and planning remedial activities to address the weaknesses you identify would be wise ideas.

Diagnostic activities do not have to be elaborate. A straightforward exercise in which students must use one or two maps can provide considerable information. If the questions are structured so that students must use all the elements of the map, students' responses should give you a clear picture of what parts of the map they have difficulty reading. You can then provide instruction to help students overcome the problems they are having.

A Structured Approach to Map Reading

Often, students learn an array of discrete map-reading skills, but they have no idea how to put these skills together in an organized approach to map-reading. Thus, providing students with a structure for approaching a map may be the most valuable strategy you can teach them.

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This structure need not be complex and could be conveyed to students in a poster that remains in the classroom all year. Steps in the process might include the following:

- Read the title of the map to see what its purpose is.
- Study the map key to see what symbols are used and what they represent.
- Orient yourself to the map by finding the compass rose or direction arrow.
- Check the map scale. If it is a world map, check the projection to see where there is distortion on the map.
- See if there are any notes on the map, such as the source of the information. This will help you evaluate whether the map is accurate or not.
- Identify some questions to answer using the map. Sometimes these questions are provided in a textbook or your teacher may give them to you. Other times, you will need to develop your own questions.

Giving students opportunities to use this approach with a wide variety of maps will help them not only internalize the process but learn how to adapt it to use with different kinds of maps. Having students write questions that can be answered using a particular map and then exchange questions with another student is also a useful exercise, particularly if students then have time to discuss the ways they used and interpreted the mapped information. As students gain greater facility with maps, the questions they develop become more sophisticated, requiring analysis rather than simply retrieval of information.

Map Making

A list of steps in creating a map, similar to those for reading maps, could also be displayed in the classroom:

- Identify your purpose in making the map.
- Based on your purpose, decide on what area your map should show. Sketch or trace the area, or find an outline map that shows the target area.
- Create a compass rose or direction arrow for the map.
- Create a scale indicator for the map.
- Decide exactly what information you will show. Create symbols to represent the information. Think about whether a point, line, or areal symbol is best for each kind of information you will show. Also think about what symbols will look good and be easy to read.
- Create a key showing the symbols you are using. Then add your symbols to the map to show the information. Add any additional labels that will make your map more readable.
- If necessary, create a grid system to help people locate information on your map.
- Give your map a title that tells its purpose.

As with creating any presentation of information, students will find it helpful to sketch a map, trying colors and other symbols, before making the final copy. Discussing their plans with classmates can be as valuable as a writing conference in preparing written work. If a local company employs a cartographer, you may want to ask that person to visit your class and discuss with students how he/she selects symbols, determines what scale to use, decides on a type face, and so on. If a cartographer is not available, the art teacher might be able to help you work with students on the design aspects of creating maps.

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Maps that students create should also be ***used***; assignments in which students gather information from maps created by their classmates can reinforce the utility of maps and provide motivation for students' map-making efforts. Opportunities to make unusual or particularly decorative maps can also be motivational. One type of map that students often enjoy making is the collage map; for example, pictures or three-dimensional objects representing various locations in your state can be affixed to a base map of the state. The resulting map can both inform others about your state and serve as artwork to enhance your classroom.

Helping Students Enjoy Maps

In helping students enjoy maps, one key point is helping students recognize that maps are useful to them. This idea might be introduced by having students note for a 24-hour period all the different ways in which they see maps being used. As an alternative, the teacher might create a scavenger hunt of ways maps are used and assign students or groups of students to find examples in the next 24 hours. Items to be found might include:

- A map that is being used for decoration.
- A map designed to help people use public transportation.
- A map that provides information about a current problem.
- A map that helps people make plans about their activities in the upcoming days.
- A map that provides information about the history of our community.
- A map that helps people understand a news story.
- A map of the school.
- A map that you used yourself.

When students have brought in their examples, conduct a discussion of the various uses of maps and provide a brief overview of how geographers in particular use maps. As a follow-up activity, have students interview adults about how they use maps in their work; if possible, have students collect and display examples of maps used in different professions.

Students could also look for examples of maps used in various media—newspapers, magazines, television news, and the like. Which media are more likely to use maps? Why do students think this is true? How do they use maps? Could they use maps more effectively? Students could also talk to people who use each medium and find out whether they tend to look first at maps or first at text. Why? What accounts for people's differing preferences?

Throughout the year, students should be exposed to a wide variety of maps—political maps, topographical and other physical maps, and a wide variety of special-purpose maps (e.g., climate maps, maps showing locations of various landmarks, population maps, maps showing major religions, and so on). Maps using different projections should also be made available so that students can compare the advantages and disadvantages of each; these different projections should include maps with different areas at the center, such as polar projections or maps with the International Date Line in the center. Discuss with students how their perceptions might be affected by most often seeing maps in which the United States is depicted in a certain position.

Students may also find the ways in which maps are used on the Internet/World Wide Web interesting. Checking out such sites as the Tiger Map Server, which can generate a map of virtually any place in the United States, generally creates a high degree of interest among adults and students alike. This service of the U.S. Census Bureau can be found at http://tiger.census.gov.

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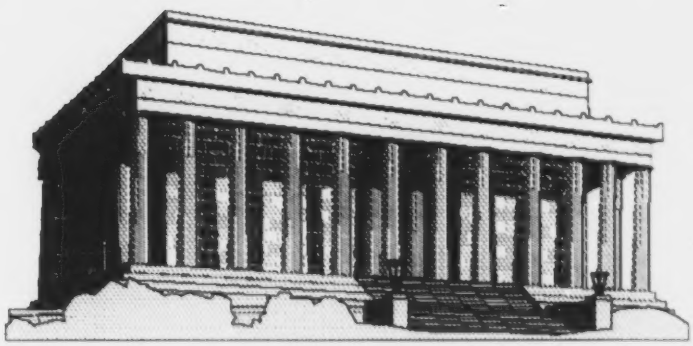
PLACES AND REGIONS



4. Images of Place: Using the Internet to Explore American Cities

Overview:

The meaning and significance of place are shaped by a variety of physical and human characteristics. In a physical sense, place is often defined by natural physical features and climate. For example, the state of Hawaii is defined by the fact that it consists of several Pacific islands. The city of San Francisco is influenced by the bay, the hilly terrain, and by the fact that it is built on and near several earthquake faults. Human forces, such as history, culture, institutions, and technology, also define place. For example, the city of Miami is greatly influenced by Cuban culture. To this day, Boston continues to be influenced by early Irish settlement.

In this activity, students use information gathered from the Internet to develop murals that depict the physical and human characteristics that give meaning to selected cities as places.

Objectives: At the end of this lesson, students will be able to:

1. Identify ways in which physical and human forces define place.

2. Explain how the meaning and significance of place changes over a period of time.

3. Explore and use the Internet as a source of information.

4. Select physical and human characteristics of a place to visually depict and provide definition to that place.

Standards Addressed: 4, 6

Theme Addressed: Place

Time Required: At least 5 class periods.

Materials and Preparation: You will need computers with Internet access, plus copies of Handout 4-1, several 10- to 15-foot-long pieces of white butcher paper, and markers, paint, or crayons.

Procedure:

1. Begin the activity by asking students how they would describe the city or town in which they live (or the town closest to where they live) to someone who has never been there. List the descriptions

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on the chalkboard. Once the list has been generated, review each item and ask for a show of hands from those who agree and those who disagree with each description. If disagreements occur, explain to students that different people and groups often view places differently. Ask students to discuss why perceptions might differ.

2. Tell students that a place (such as a city or town) can be described by its physical characteristics, such as climate, landforms, and vegetation, and by its human characteristics, including history, culture, institutions, and technology. Ask students to identify which of the descriptions of the town or city they identified on the chalkboard are physical characteristics and which are human characteristics. Place a *P* or *H* by the items to indicate the two general categories.

3. Next, ask students how someone living in their community 25 or 50 years ago might have described the community. List the descriptions on the chalkboard. Ask students to compare the "then" list to the "now" list, identifying reasons for the differences. (**Note:** In this step of the activity it is important that students understand that time and events create real and perceptual changes in place.)

4. Tell students that they are going to be provided an opportunity to go online and use the Internet to identify the physical and human characteristics that define several U.S. cities. Indicate that they will work in teams to gather information about U.S. cities from several Internet web sites. Once they have gathered the information, they will translate the information into a mural that depicts some of the physical and human characteristics that give their assigned city its identity. For purposes of illustration, ask students to discuss how they would produce a mural depicting the city described in Step 1. (**Note:** Be sure that students understand that their images would be based on their perceptions of the important physical and human characteristics identified in Step 1 above.)

5. Next, organize students into six small groups. Assign one of the following cities to each of the small groups: Detroit, Michigan; Los Angeles, California; Memphis, Tennessee; New York City; San Francisco, California; and Seattle, Washington. (**Note:** You may want to work with different cities. However, the student activity sheet has been designed to guide students to information on these six cities.)

6. Provide students with copies of Handout 4-1. Tell them they will be responsible for using the Internet to gather information requested on the student handout. Stress that although several sites have been identified to assist with their search, time permitting, they should explore further. Also remind them that after they have gathered information on their cities, they will be creating murals that illustrate the uniqueness of their cities as places.

7. After students have gathered information on their assigned cities from the Internet, provide each group with a large piece of butcher paper and markers. Instruct each group to convert the information gathered from the Internet into images that represent the unique physical and human characteristics of their assigned city. Encourage them to spend some time in discussion and planning before they start drawing. They may want to agree on what makes their city unique or choose themes around which to create the mural.

8. Once the murals have been completed, ask each group to explain how their mural represents their city as a special place. As students explain their murals, probe as to whether they are able to distinguish between physical and human characteristics of place. Can they explain how social, cultural, and economic processes have helped to define their city? Have they accurately interpreted how physical characteristics have helped to create their city as a place? Additionally, determine whether students can explain why a variety of points of view exist as to the definition of place. (**Note:** If possible, find a place to display the murals for others to see.)

9. Conclude the lesson by assessing the degree to which students were able to make use of the Internet as a source of information. Was it useful? What did they learn about accessing information

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from the Internet? Is it something they would use on a regular basis? What was their greatest challenge?

Extension/Enrichment:

1. Students may be interested in creating a mural that represents their community as place. They may wish to work with community leaders to find an appropriate place for the mural and with local artists for help on designing and creating the community mural.

2. A number of organizations create rating systems for cities, such as the best city to raise a family, the best city for young singles, etc. Zero Population Growth calculates the Children's Environmental Index, which measures "the social and physical environment of children." The index includes variables related to health, education, economics, crime, and the environment. According to this index the top and bottom five cities are:

Top Five	**Bottom Five**
1. Naperville, IL	1. Gary, IN
2. Overland Park, KS	2. Detroit, MI
3. Irvine, CA	3. Newark, NJ
4. Plano, TX	4. St. Louis, MO
5. Fargo, ND	5. Hartford, CT

Challenge students to create their own rating system for cities and then to use the system for rating their own city and the cities studied in this lesson.

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IMAGES OF PLACE: EXPLORING CITIES ON THE INTERNET

In the next several days, your team will create a mural that illustrates the unique physical and human characteristics that define your assigned city as a place. To assist you in gathering information, you will be using the Internet. Below are listed different categories of information, along with suggested Internet sites and hints for obtaining the information. Visit each of the sites and find and record interesting information about your assigned city. Remember, you are exploring the Internet for information about the physical and human characteristics that make your assigned city unique. Once you have identified these characteristics, you will turn them into images on a mural.

Unique Physical Characteristics

Excite's City Search
http://www.city.net/

Hint: Enter the name of your city in the Search window and click on "take me there." Once you arrive at the city site, choose MAPS from the Travel Tools menu. The site uses Mapquest, which allows you to zoom-in on maps to get more detailed information. You can also find information about sights, the arts, weather, and many other topics at this website.

Magellan Geographix
http://www.maps.com/

Hint: Click on Interactive Atlas and follow directions to narrow the search to arrive at your city.

U.S. Census Bureau - U.S. Gazetteer
http://www.census.gov/cgi-bin/gazetteer

Hint: Enter the name of your city in the Search window and click on "Search." The site provides city maps as well as statistical information from the last census. Click on the colored hot links to access maps (MAPS) or statistical information (STF). The interactive maps are provided by Tiger Map Service.

General Information/Human Characteristics

USA Citylink
http://www.usacitylink.com/

Hint: Upon arriving at the home page, click on "Visit a City" graphic. On the next screen, click on the state in which your city is located. Next click on your city. This site provides a wealth of information on government, business, demographics, and much more.

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Digital City
http://www.digitalcity.com/

Hint: Does not provide information on Memphis. The home page is a map with cities highlighted. Click on your city to access information on art and culture, people, news and media, local history, sports and recreation, and much more.

Galaxy
http://www.einet.net/galaxy.html

Hint: On the home page directory, click on "Community." On the next screen, click "U.S. States." Next, select the state in which your city is located, click on it and then click on your city. The site provides lots of local information.

News and Up-to-Date Information

Editor and Publisher On-Line Newspapers
http://www.mediainfo.com/ephome/npaper/nphtm/online.htm

Hint: On the home page, click on "United States." On the next screen, click on the state in which your city is located. On the next screen, you will be provided a list of newspapers from that state. Click on the newspapers located in your city.

American Journalism Review
http://www.ajr.org/

Hint: On the home page, click on "Newspapers." On the next screen, click on "United States (by state)." On the next screen, click on the state in which your city is located. Next select newspapers from your city.

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5. Urban Bird Watching

Overview:

In an urban setting, helping students recognize natural features of the environment can be challenging. This lesson is designed to help students see that, even in a city, nature is all around them, in their own backyards and on the way to school. The lesson gets them out of the classroom to embark on an urban bird-watching study in which they will not only learn a great deal about one particular natural characteristic of the place in which they live but also about the power of observations.

Objectives: At the end of this lesson, students will be able to:

1. Describe bird watching as one technique for learning about a natural characteristic of place.
2. Use a field guide effectively.
3. Accurately identify birds found in their community.
4. Develop generalizations about the impact of urban growth on wildlife.

Standards Addressed: 4, 14

Theme Addressed: Place

Time Required: 3-4 class periods, followed by approximately 3 weeks of observations, a field trip, and 2 class periods to complete the study.

Materials and Preparation: For each group of four students, you will need a bird-watching guide appropriate to your geographic region, such as *Peterson's Field Guide to Birds East of the Rockies* (Houghton Mifflin, 1980) and a pair of binoculars; from the guide, you will find it useful to develop a bird identification list with 30 to 40 birds that might be expected to be seen in your area. An example created by the author of this lesson, a teacher in Takoma Park, Maryland, is provided in Handout 5-1. You will also need a copy of the video *Watching Birds with Roger Tory Peterson* (Metromedia and Houghton Mifflin, 1981) and copies of Handouts 5-2 and 5-3 for all students. Finally, you will need to arrange a field trip to a park, forest preserve, or rural area near the end of the study period.

Procedure:

1. Use the video *Watching Birds with Roger Tory Peterson* to introduce the concept of bird watching. Allow time for discussion of ideas presented in the video.

2. Present students with the following scenario:

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The MCS (Make Cities Smaller) environmental group is circulating a petition. They believe that because of the growth of our city, there are fewer wild animals than when the area was rural. They propose to severely limit the number of building permits issued per year in order to restrict further growth. You have been hired by the BIB (Big Is Better) Construction Company to do a study to determine if there are fewer wild animals in our city than in the surrounding rural areas and recommend whether construction should be regulated as a result.

3. Organize the students into cooperative groups of four. Ask each group to brainstorm possible approaches to the problem. Students often suggest counting all varieties of wild animals, but many of them are nocturnal. They also consider counting dogs and cats, but through guidance and questioning, students realize that domestic animals will not lead to a solution to the problem. Some suggest counting roadkill, but this is neither pleasant nor safe. Through discussion, guide students to discover that counting birds is a workable alternative.

4. Assign roles to each group member. The Crew Chief supervises the group; the Technical Assistant is responsible for the binoculars; the Librarian handles the field guide; and the Reporter records the group's observations. Distribute binoculars, field guides, and copies of the "Bird Identification List" you have created for your area to the groups. Explain that over a four-week period, students will observe and identify the birds they see on the way to and from school each day. On their "Bird Identification List," students will note the group, number, and habitat of each bird, as well as other observations. Each student will keep an individual "Bird Identification List" and then combine this information with the other group members.

5. To familiarize students with the field guide, have them spend a class period completing Handout 5-2. Students learn about Peterson's eight bird groups and the various features of the guide.

6. Allow some time each day during the observation period for students to meet in groups and combine information. You may want to take the class on bird walks around the school once or twice during the four-week period.

7. Near the end of the fourth week, arrange a field trip to a remote park, forest preserve, or rural area. The data gathered at this site will allow students to make comparisons with the data they have collected in the city. The trip will likely give students an opportunity to see some species they have not encountered previously.

8. Once the study has been completed, have student groups pool their data and answer the questions on Handout 5-3.

9. Ask each group to use their data to write a letter to the BIB Construction Company discussing their findings and recommendations. Allow time for students to present their letters to the class.

10. Conduct a final discussion of what students learned from this experience. Students often note that, in the city, they were more likely to see large numbers of the same species, such as starlings or crows, while in the rural area, they were able to see 10 to 15 different species in only one day. This observation leads to a discussion of diversity and how diversity is more indicative of the impact of urbanization than the sheer number of birds.

Extension/Enrichment:

Encourage students to use the same skills of observation that they used in this lesson in developing greater information about other natural characteristics of their environment. For example, what plants do they observe growing in their location?

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BIRD IDENTIFICATION LIST

The following is an alphabetical list of birds commonly seen in this area. Use this list to tabulate information about the birds you see. You should see at least 25 different birds over the course of the project.

Bird	Date	Group	Habitat	Notes
American black duck				
American common crow				
American goldfinch				
American kestrel				
American robin				
Barn owl				
Barn swallow				
Belted kingfisher				
Black-capped chickadee				
Blue jay				
Bobwhite				
Canada goose				
Common grackle				
Double-crested cormorant				
Downy woodpecker				
Eastern bluebird				
Great blue heron				
Great egret				
House sparrow				
House finch				
Killdeer				
Herring gull				
Laughing gull				
Mallard				
Northern cardinal				
Northern flicker				

Adapted from *Everybody's Everywhere Backyard Bird Book* (Klutz Press, 1992) and *Bird Checklist of the Patuxent River Park* (Maryland-National Capital Park and Planning Commission).

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Bird	Date	Group	Habitat	Notes
Northern mockingbird				
Northern oriole				
Meadowlark				
Mourning dove				
Red-tailed hawk				
Red-winged blackbird				
Rock dove				
Ruby-throated hummingbird				
Starling				
Tufted titmouse				
White-breasted nuthatch				
Vilture				

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USING THE FIELD GUIDE

Complete the following questions to familiarize yourself with the field guide you will be using in your bird study.

1. In the video *Watching Birds with Roger Tory Peterson*, Peterson divides the birds into eight groups. Find the list of groups in the field guide and mark it with a self-adhesive note. Page _____

2. Does the book have an index? Y N Mark it with another note.

3. Inside the back and front covers are silhouettes. How could these be helpful in your bird study? _____

4. Look at the following lists of birds and decide which of Peterson's groups they represent. Write the name of the group on the top line. Number each list from smallest to largest.

Group _____ from page _____ to _____	Group _____ from page _____ to _____
_____ ring-billed gull	_____ turkey vulture
_____ little tern	_____ peregrine falcon
_____ herring gull	_____ sharp-shinned hawk
_____ white pelican	_____ osprey
_____ laughing gull	_____ bald eagle

5. Use self-adhesive notes to mark the beginning of each section in the book. Familiarize yourself with the sections and label them for easy reference during your study.

6. Why might the laughing gull have this name? _____

7. Can the sounds birds make help you in this study? How? _____

8. Find the Baltimore oriole. Page _____

   What do the following symbols mean? ♂ _____ ♀ _____

9. What page are the "exotics" found on? ____ What are exotics? _____ or _____

10. Look up the sizes of the following birds and record the information on the lines provided.

Bird	Size (centimeters)	Size (inches)
common grackle	_____	_____
common crow	_____	_____
turkey vulture	_____	_____
starling	_____	_____

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Look up the following birds and determine which of the above birds is nearest each in size. Use *G* for grackle, *C* for crow, *V* for vulture, or *S* for starling.

_____mourning dove	_____mockingbird
_____Canada goose	_____red-winged blackbird
_____mallard	_____black-capped chickadee
_____robin	_____bobwhite
_____cardinal	_____double-crested cormorant

11. If a written description has *M336* to the right of it, what does this mean?_____

12. List the eight groups of birds according to Peterson. Suggest an abbreviation to be used during your bird study. We will decide on standard abbreviations as a class.

Bird group	**Abbreviation**	**Bird group**	**Abbreviation**
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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OBSERVATIONS AND DATA

After your study is completed, answer the following questions to help you analyze your data and observations.

1. Total number of different bird species you have seen _____
   Average for your group _____
   Average for the class _____

2. Total number of urban bird species you have seen _____
   Average of urban birds for your group _____
   Average of urban birds for the class _____

3. Total number of rural bird species you have seen _____
   Average of rural birds for your group _____
   Average of rural birds for the class _____

4. Which of these statistics will be most helpful in your investigation of the number of birds in our city? Put a star by those numbers and explain why they're most helpful.

   _____

5. Did any bird species "disappear" after a certain date? Y N

   Why might this be?_____

6. What is the Christmas Bird Count (done by groups such as the Audubon Society)?

   _____

   _____

7. What problems would the Christmas Bird Count solve in regard to what we are attempting to find out?

   _____

8. What problem might be made worse by this one-day count?

   _____

   _____

9. A good study or experiment should answer *one* question but may raise several more. Is this a good study? Why or why not?

   _____

   _____

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10. What other questions arise from your study?

a. _____

b. _____

c. _____

d. _____

e. _____

11. On a separate piece of paper, list the important points that you think need to be included in a letter to BIB Construction. Briefly explain what you did to investigate the problem and what your conclusions are. With your group, compose a rough draft and then a final copy of the letter. Hand in the final copy, along with the data and observations from each person in the group. You will also present your letter to the class in a symposium format.

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6. The Nine Nations of North America

Overview:

Political divisions are generally so taken for granted that we rarely think about characteristics that distinguish our state from another or one nation from another. By asking students to consider dividing North America into nine nations, this lesson forces them to reflect on what is unique about various regions of the continent.

Objectives: At the end of this lesson, students will be able to:

1. Understand the physical and human characteristics that help to define a region.
2. Create a new division of North America by applying what they know about regions.
3. Examine trends that lead to expanded contacts and interrelationships between nations.

Standards Addressed: 5, 13

Theme Addressed: Regions

Time Required: 1-2 class periods

Materials and Preparation: You will need copies of Handouts 6-1 and 6-2, as well as student atlases. One of more copies of the book *The Nine Nations of North America* (Boston, MA: Houghton Mifflin, 1981) would also be useful.

Procedure:

1. Ask students to think about what it would mean to have nine nations in North America instead of three (North America is defined in this activity as Canada, United States, and Mexico). What would be the implications for travel, trade, currency, government, and foreign policy?

2. Tell students that a *Washington Post* journalist named Joel Garreau made a yearlong trip through North America. He "discovered" what he viewed as nine separate nations based on similarities and differences among regions. He later wrote a book about his experience, *The Nine Nations of North America*. Tell students in which of Garreau's nine nations their community is located. Read the definition of this nation from Handout 6-2. Having some idea how Garreau divided the nations will help students with the next part of the lesson.

3. Distribute Handout 6-1 and the student atlases. Discuss with students some of the factors they might use in dividing the map into nine nations. If necessary, provide definitions and examples of the following factors:

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language and culture	topography
trade and manufacturing	population density
natural resources	climate

Note: Make sure students work within the boundaries of Garreau's trip, which are shown on the map.

4. Have students defend their reasons for division of the continent in a class discussion.

5. Distribute Handout 6-2 and have students compare their "nations" and those created by Garreau. Which criteria were most important to them? to Garreau?

6. Discuss with students why the idea of nine nations might be important. For example, you might discuss whether one government can adequately represent people with interests and needs as diverse as those in Mexamerica and New England.

With older students, you might explain that Garreau ends the first chapter of his book with a story about a newspaper reporter who decided to move from the nation's capital back to the west, where he had grown up. The reporter was concerned about whether he was making a good decision until he reached Cheyenne, Wyoming. Here is what Garreau says:

> It was there, he said, that suddenly a knot disappeared from his stomach, a knot he hadn't known was there. It was there that he discovered a feeling of familiarity with the colors, the horizon, the names of the towns.
>
> Every North American knows a place like that, a place where, on your way back from your wanderings, surroundings stop feeling threatening, confusing, or strange.
>
> Ultimately, that's the reason we are Nine Nations. When you're from one, and you're in it, you know you're home.

Students might discuss this observation with their parents. Do parents feel an intense loyalty to the region in which they were raised, even if they no longer live there? Why is this important to them?

Extension/Enrichment:

1. Using the same variables, ask students to research regions of the world where national boundaries may not indicate the physical/human characteristics of the region (Africa, for example, where tribal loyalties may be more important than political boundaries artificially created by colonial powers).

2. Older students may want to read and report on excerpts from Garreau's book.

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CREATING THE NATIONS OF NORTH AMERICA

The map below shows the area Joel Garreau divided into the "nine nations of North America." Study maps of this area in an atlas. With a partner, decide how you would draw nine nations in this area. Consider such factors as language and culture, trade and manufacturing, natural resources, topography, population density, and climate.

Give each nation a name that indicates what characteristics set it apart from the others.

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GARREAU'S NINE NATIONS

Quebec

History, language, culture, food, music are all distinct as a result of French heritage; strong movement to separate from the rest of Canada; tremendous source of hydroelectric power.

New England

Few natural mineral resources; moving away from imported oil towards hydroelectric power and conservation; strength in the fishing industry; heavy immigration from maritime provinces; stormy historical/cultural traditions merging the past with the future; major base for high-tech industries.

Foundry

Emphasis on traditional 19th-century manufacturing, iron, steel, autos; heavily urbanized and unionized; includes Southern Ontario; relatively high levels of unemployment, plant closings, and decaying urban areas; needs to move into the next century without losing its traditional manufacturing base.

Dixie

Non-union, mostly rural; strong growth in the past 15 years, but mostly of the catch-up variety; heavily agricultural pockets of extreme poverty; distinct architectural styles; other industries include fishing, shipbuilding, steel, and tourism; selected movement towards power sharing between blacks and whites.

The Islands

Two-way flows in immigration, trade, drug traffic, and tourism between southern Florida and the Caribbean; Miami, the drug capital of the Caribbean; 53 different ethnic groups in south Florida with Cubans dominant in accumulation of wealth; Spanish the predominant language in many sections of Miami, including downtown.

Mexamerica

Growing influence of Spanish culture on food, language, customs, etc.; legal and illegal immigration; the "Sun Belt"; heavy growth but water and energy are problems; growing Mexican-American middle class with expanding ties to Latin America; Los Angeles now the second largest Spanish-speaking city in North America after Mexico City.

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Ecotopia

Industries are service-oriented and high tech; natural markets and cultural lifestyle coming from Pacific rim countries; similar to New England in its concern for conservation and alternative energy sources; high tolerance for alternative lifestyles.

The Empty Quarter

Open space, sparsely populated; mineral resources; strong anti-government, anti-Washington feelings; water a major problem; high growth "boom towns" based on energy development now on the decline; includes major portions of Western Canada.

The Bread Basket

Very stable economic growth; very sensitive to foreign markets; most insular yet tied to the world through its agricultural exports; people in Manitoba have more in common with American farmers of the Midwest than to their eastern Canadian counterparts; conflict between small farmer vs. large multinational business.

Aberrations

N.Y.—Information processing, financial markets, communications center.

Washington—Government, bureaucratic structure.

Alaska and Hawaii—Geography, location, ethnic characteristics.

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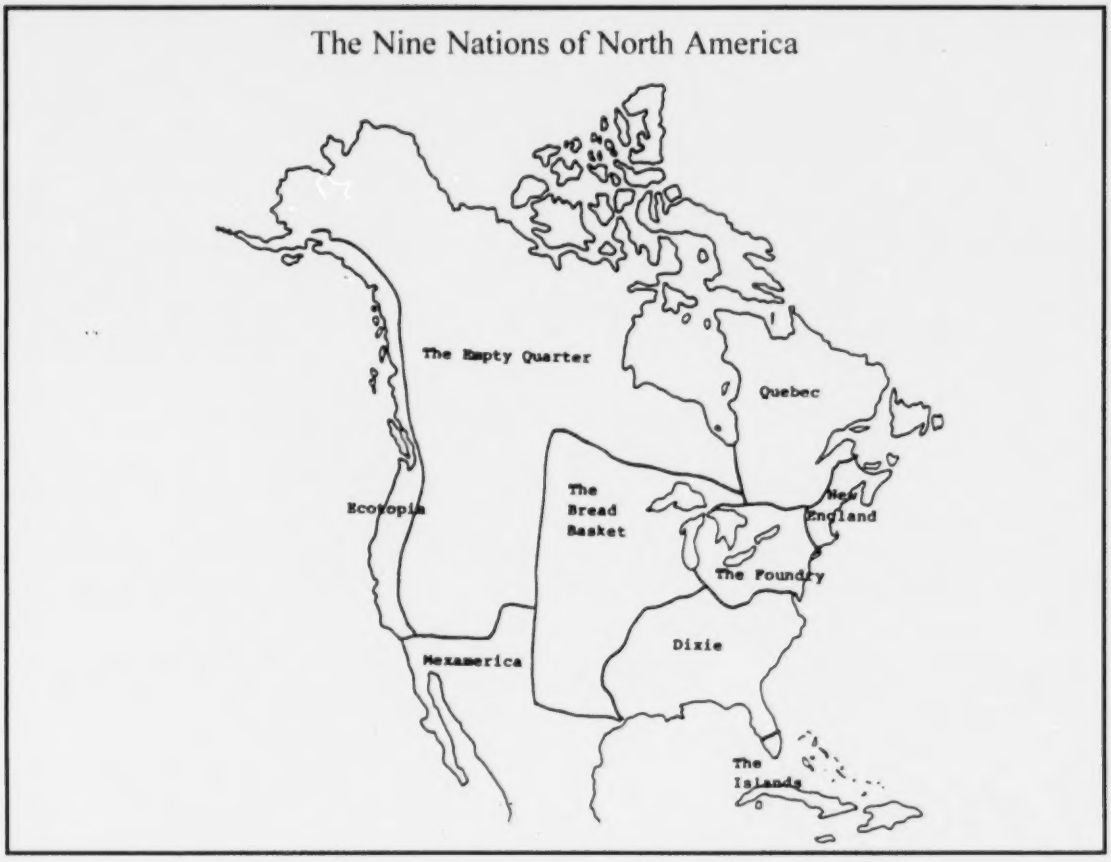

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7. Understanding Place Through Literature

Overview:

Geographer David Hill has called place "a deceptively simple concept." Indeed, understanding place involves analyzing the elements of the natural and human environments, as well as recognizing the importance of people's responses to a place. This lesson is designed to help students explore these aspects of place using visuals and a very accessible form of literature—picture books.

Objectives: At the end of this lesson, students will be able to:

1. Explain and give examples of physical and human characteristics of a place.

2. Describe their own reactions to places shown in visuals and described in picture books and explain why different people react differently to particular places.

3. Analyze the portrayal of all aspects of place in a piece of children's literature.

Standards Addressed: 4, 6

Theme Addressed: Place

Time Required: 2 class periods

Materials and Preparation: You will need a number of evocative visuals of places, some showing mostly natural features, some showing mostly human-made features, and some showing both. These visuals can be cut from old *National Geographics* or other magazines or from photo catalogs. You will also need copies of Handout 7-1 and several children's literature books. The list below is intended as a starter list, but the children's librarian at your local library can help identify others.

Antler, Bear, Canoe: A Northwoods Alphabet Year, by Betsy Bowen (Boston: Little, Brown, 1991).

Empty Lot, The, by Dale H. Fife (San Francisco: Sierra Club and Boston: Little, Brown, 1992).

Fly Away Home, by Eve Bunting (New York: Clarion Books, 1991).

Grandfather's Journey, by Allen Say (New York: Houghton Mifflin, 1993).

Jamaica Louise James, by Amy Hest (Cambridge, MA: Candlewick Press, 1996).

Time to Go, by Beverly and David Fiday (San Diego: Gulliver Books, 1990).

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Uncle Jed's Barbershop, by Margaree King Mitchell (New York: Simon and Schuster, 1993).

Uncle Willie and the Soup Kitchen, by DyAnne DiSalvo-Ryan (New York: Morrow, 1991).

When Africa Was Home, by Karen L. Williams (New York: Orchard Books, 1991).

Where Once There Was a Wood, by Denise Fleming (New York: Henry Holt, 1996).

Window, by Jeannie Baker (New York: Greenwillow Books, 1991).

Procedure:

1. Distribute one visual to each pair or trio of students. Ask students to spend a few moments imagining themselves in the scene shown in the picture. Then ask students to free write for two to three minutes, describing the setting and their responses to it. When the time is up, ask students to share some of the words or phrases they used to describe the setting. Post these words in three columns—one for the physical environment (e.g., cold, snowy, mountains), one for the built environment (e.g., cabin, swing), and one for human emotional and intellectual responses to the environment (e.g., cozy, lonely). After posting a selection of words and phrases, discuss with students the importance of all three categories of information in understanding what a place is like.

2. Have student pairs or trios talk about their responses to the pictured setting. Did they have similar responses? Why or why not? How do individuals' experiences influence their responses? Allow groups to report out and post some of the reasons for similar and different responses.

3. Ask students to think about why place is important to people, in real life and in stories. Read the following quote from children's author Patricia MacLachlan: "Place. This is one of my favorite words, and I am a writer because of it...I cannot write a story unless I know the place, the landscape that shapes the story and the people in the story." MacLachlan wrote these words in an essay called "Bringing the Prairie Home," from *The Big Book for Our Planet* (New York: Dutton, 1993), which you might want to share with students.

4. Divide the class into as many groups as you have picture books. Give each group one picture book and a copy of Handout 7-1. Allow time for them to read and discuss the book.

5. Allow time for groups to report out on their analysis. Conduct a discussion of what students learned about the concept of place through this activity, focusing particularly on human responses to place and how those responses can be conveyed through art and words.

Extension/Enrichment:

1. Encourage students to do a similar analysis of books they are reading for pleasure or for language arts class. How do authors convey information about place when they do not have illustrations to work with? What kinds of descriptive language are particularly effective in students' views?

2. Assign students to choose a visual of a place to which they have a strong reaction—negative or positive. Ask them to find a poem that they think matches the visual in some way. On poster board, have students display the paired poems and visuals with a brief written explanation of why they chose to pair the two items. A wonderful model for this activity can be found in the book *Celebrate America in Poetry and Art*, edited by Nora Panzer (New York: Hyperion, 1994).

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Analyzing How Authors and Illustrators of Children's Books Depict "Place"

Read your book with the group, taking time to study the illustrations. Then discuss the following questions in your group. Be prepared to report to the class on the most interesting aspect of your group's discussion.

1. What place is being described in the book? How do you know?

2. How do the words convey a sense of place? What metaphors are effective? What descriptive words help you imagine the place?

3. Does the book do a better job of describing the natural environment, the human environment, or human responses to the place? Give reasons for your answer.

4. How do the illustrations convey a sense of place? Do the illustrations also show human responses to the place? Why or why not?

5. Why is place important to this story? Why are human responses to place important?

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Active Teaching: Using Literature

A good book, story, or poem can create an entire world, often complete with well-defined physical and cultural characteristics. The reader may be able to describe in detail where the action took place, the landscape in that place, the homes of characters inhabiting this fictional (or real) world, the means of transportation the characters used, and the links between this place and others. While we seldom think of reading trade books (books that are not textbooks, including works of fiction, poetry, drama, and nonfiction) as a way of learning about geography, immersion in a well-described literary world, whether real or imaginary, can develop significant geographic understandings. Further, well written literary works provide models of powerful descriptive language, language that geographically informed citizens should be able to use in discussing places and geographic issues.

While we believe that literature and geography should be linked in classrooms, a caution is in order. As Hepler (1988) has pointed out, activities developed around works of literature "should serve the reader and the book first, not some particular curriculum area." For example, a middle school teacher might see a book such as *Thunder Cave*, by Roland Smith (New York: Hyperion, 1995), as the basis for a unit on environment and society or African animals; to the middle school readers in his/her class, however, the book may be primarily an adventure story, a coming-of-age novel, or a look into a culture where the interactions between humans and nature are seen very differently than they are seen in this culture. Students need the chance to explore the book from these perspectives before or while they examine geographical aspects of the story. Furthermore, there may be no quicker way to dampen students' enthusiasm for a book than by suggesting that reading it is a social studies assignment.

Thus, we do not recommend turning books into geography lessons focused on specific geographic content/information. Rather, we suggest teachers think about literature as a way to enhance students' understanding of "big ideas" in geography. By adding carefully crafted discussion questions that probe geographic issues, teachers can expand students' understanding of geographic ideas—and of the book. Similarly, teachers can build on students' interest in a particular book by developing geography-based projects to complete in conjunction with reading and discussing the book.

Throughout this book, we provide several literature-based geography lessons; the model unit concluding the book also includes a study guide for use with a novel whose story can be used to support the unit. In this section, we provide some general tips about using literature to develop "big ideas" in geography.

World in Spatial Terms

While it may seem obvious, simply having students map the settings of stories they are reading is useful in developing map skills, locational knowledge, and a general sense of the "world in spatial terms." Use of this strategy can be as simple as having students locate the places they read about on a large wall map, using pushpins or stickers on which the names of the books are written. If space is available around the margins of the map, students could clip pictures of the setting from old textbooks, travel or photography magazines, or photo service catalogs; mount the pictures around the edges of the map; and attach the picture to the appropriate location on the map using string or yarn. Some books—

Adapted and expanded from *G Is for Geography: Children's Literature and the Five Themes*, by Laurel Singleton (Boulder, CO: SSEC, 1993).

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both those written specifically for adolescents (see, for example, *Children of the Fire*, by Harriette Gillem Robinet, which includes a map of the Chicago fire based on documents at the Chicago Historical Society) and adult works (many of Faulkner's books contain an author-created map of the fictional Yoknapatawpha County, Mississippi)—include maps showing the setting in which the story occurs. Students could reproduce these maps in a larger format and keep track of where the action in the story occurs on the larger display maps. Students could also simply create their own maps of a book's setting, adding to and refining the map as they read.

Places and Regions

Students' observation of characteristics of place could be reinforced by having them create new dust jackets for books (including those whose jackets have long since been discarded and those that students think have ugly or undescriptive jackets). Encourage students to show as much about the setting as possible in their designs. As another option, students might create coat-hanger mobiles representing book settings; the mobiles could include drawings, as well as such real objects as leaves, flowers, pinecones, or small rocks.

One way to develop students' understanding of the intangible aspects of place is by encouraging them to imagine themselves in the settings of books they read. What would they see, smell, hear, etc.? After students have read several books, ask them to consider in which setting they would rather live and why. They might write real estate ads for homes in particular literary settings. What characteristics of the place do students think would be most and least attractive? Why?

Many books can stimulate discussion of differing perceptions of place. The recent bestseller *Snow Falling on Cedars*, by David Guterson (San Diego: Harcourt Brace, 1993), draws particularly well the varying meanings that different groups, particularly Scandinavian Americans and Japanese Americans, give to the land and ocean. While presented as a murder mystery/courtroom drama, this book explores issues of alienation and racism.

Books can also convey a sense of how places change. For example, *Steal Away Home*, by Lois Ruby (New York: Macmillan, 1994), tells the story of Dana and her family, who move into a historic house in Lawrence, Kansas, and find a skeleton and diary in a small, boarded-up alcove. Through Dana's reading of the diary and the alternating story of the Quaker family that lived in the house in the 1850s, readers learn about a young black woman's courage in helping slaves escape to freedom along the Underground Railroad. The book provides a vehicle for looking at the changes in a community over more than 100 years, as well as looking at connections among places.

The concept of region may seem quite abstract to many students. Thus, comparing regions with their own may be helpful. When students have read a book that has provided considerable information about a region, they could identify features that the region in the book and their own region have in common, as well as distinguishing features. Students could create a scavenger hunt, listing wildlife or other features they have learned are common to a particular region. They could then look for those items in their own community, identifying which are common to both regions and which appear to be unique to the region under study. Students might also plan a trip to the region about which they have read, listing the things they would need to take and what they might bring back with them that would represent the region especially well.

Students could also read two books set in the same time period but in different regions and make comparisons to learn more about regional differences. For example, Mildred D. Taylor's *Mississippi Bridge* (New York: Dial Books, 1990) and Phyllis Rossiter's *Moxie* (New York: Four Winds, 1990) are both set in the Depression, one in Mississippi and one in Kansas. While both deal with intolerance and with the effects of the Depression and of natural hazards, the specific stories are quite different because of the regions in which they are set.

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It can be helpful to have students develop a set of geographic questions that can be used to describe the geographic setting of any novel. A set of questions based directly on the five themes are:

- Where did the story take place?
- According to the story, what is this place like? Where else could I find information about what this place is like?
- How did the environment in the story affect people? How did people affect the environment?
- What examples of movement among various places on earth can be found in the story?
- Are any regions—areas that share special characteristics—mentioned in the story? If so, what characteristic made each region special?

Students could share geographic information about story settings through various kinds of visual displays, such as posters, mobiles, dioramas, and picture cubes. Picture cubes are made from six equal-sized squares; information or pictures are put on five of the squares before they are taped together (the sixth square is left blank so string for hanging the cube can be taped to it). Each one of the five squares could be devoted to one of the themes. For example, on one square the student could draw a map showing the location of the story setting; on the second square, he/she could make a chart showing the physical and built features as well as personal reactions to the place; and so on.

Geographic questions could also be used in simulated press conferences with characters from stories students have read. While the main story written by "reporters" after the press conference might focus on the character's achievements or some other aspect of the story, the geographic information could be used to write a "sidebar," or accompanying article, on where the character lives.

Environment and Society

To develop awareness of how people depend on the environment, students could build a pyramid showing the environmental base on which human activities rest. To start this project, cover a bulletin board with paper and trace the outline of a pyramid on the paper. Lightly trace the outline of blocks or bricks over the surface of the pyramid; in the triangle formed at the peak of the pyramid, place a picture of several fictional characters who are favorites of the students or a picture of the students themselves. Tell students that they are going to build a pyramid showing how people depend on or need the environment; give or have students give some examples from their own lives. Explain that the pyramid will be built using examples from books that students read. Each time they find an example of how characters in a book depend on the environment, they can list the example and the title of the book in one of the squares on the pyramid. A student should only use one example per book, although another student may use an example from the same book. When students complete the pyramid, conduct a class discussion of the various examples they found.

Through discussion of works of historical fiction that involve settlement of new lands, students can be helped to understand both how humans adapt to different environments and how they change the environment. Following such a discussion, students might draw a picture of a place from the book, accompanied by a picture of what they think the place looks like today. In the caption, they could tell why the place changed.

A novel like *Bless Me, Ultima*, by Rudolfo Anaya (New York: Warner Nooks, 1972), can vividly illustrate the different cultures that develop in different environments. This "coming of age" novel portrays the conflict between the ranching tradition of the high plains represented by the protagonist's father, and the farming tradition of the river valleys where his mother's family lived. Students might

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chart the contrasting values and lifestyles of the high plains and valley as preparation for discussion the cultural conflicts Anaya portrays.

Uses of Geography

Biographies of environmental activists provide opportunities to see what one person can do in terms of using geographic and scientific knowledge to work to improve the future. For example, Eden Force's biography, *John Muir* (Englewood Cliffs, NJ: Silver Burdett Press, 1990), recounts the life of the founder of the Sierra Club, who had a deep love of place and was concerned about the relationship between people and the environment. Born in Scotland, Muir emigrated to Wisconsin as a boy, but found his true home in the Yosemite Valley of California. After reading and discussing the book, students could undertake a wide variety of projects. Some examples are:

- Have students prepare a world map that shows John's travels from boyhood until his death. They may want to use a special symbol or color to show places John lived and another symbol or color to show places that he visited. They might also create special symbols to show what John studied or was looking for at various locations.
- Students could research the work of the Sierra Club today. What kinds of materials do they produce? What kinds of projects do they undertake? What groups oppose their work? Why? What does this tell us about using geography to improve the future?
- Students could create a "Jackdaw" for John Muir. A jackdaw is a box containing artifacts and documents that represent the person and the culture in which he lived. The Jackdaw could be shared with other classes to give them a sense of John Muir's life and times.

All of these projects could be adapted for use with biographies of other environmental activists.

While science fiction can also provide an interesting impetus for discussing how geographic knowledge can be used to shape the future, many science fiction books provide bleak images of the future. In Caroline Macdonald's *Lake at the End of the World* (New York: Dial Books, 1989), much of the environment has been destroyed by careless humans, but the book still provides a positive portrayal of young people shaping the world. Set in 2025, the book tells of a family alone on a remote lake in New Zealand and an underground community facing its own deteriorating conditions. How these two groups might use their knowledge to build a future should provide an excellent topic for discussion.

References

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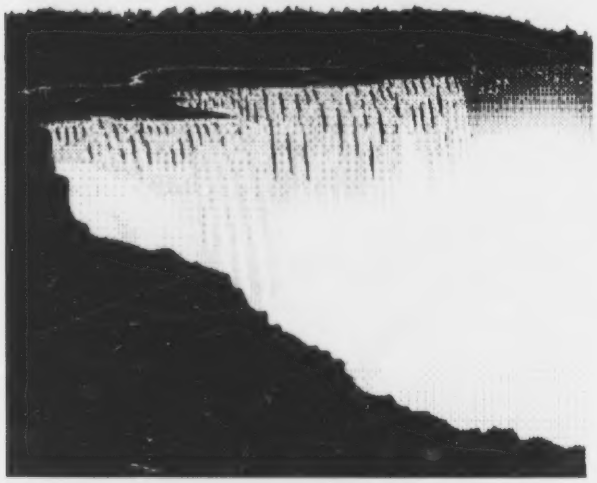
PHYSICAL SYSTEMS



8. Tomorrow's Forecast: Oceans and Weather

Overview:

The oceans influence the world's climate by storing vast amounts of solar energy and distributing that energy around the planet through currents and accompanying atmospheric winds. Dramatic weather events like hurricanes originate at sea, and the oceans also influence long-term conditions such as average daily temperature and rainfall. These factors in turn affect the variety and volume of crops that can be grown and the number of fish that can be caught. The world's oceans and their integral role in weather and climate are the focus of this lesson, which can be taught using print resources or using the Internet.

Objectives: At the end of this lesson, students will be able to:

1. Identify the basic circulation patterns of the oceans.
2. Evaluate the relation between ocean currents and trade routes of the past.
3. Evaluate climatic data from coastal and inland regions.
4. Explain the importance of the differing heat capacities of water and air.
5. Analyze data for evidence of El Niño and describe El Niño's effects.

Standards Addressed: 1, 7, 15

Themes Addressed: Relationships within Places, Movement

Time Required: 4-5 class periods

Materials and Preparation: You will need to read through the lesson to determine whether you will use strictly print resources or Internet resources to complete the lesson; based on this decision, you will need to either copy Handouts 8-1 and 8-2 for all students and ensure that print resources on El Niño are available or make arrangements for students to have access to the Internet on the appropriate days. You will also need copies of Handouts 8-2 through 8-5 for all students; world maps or globe; and four thermometers, four small jars of equal size, and water.

Adapted from *Art to Zoo* (September/October 1995). Used courtesy of the Smithsonian Institution, Office of Education.

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Procedure:

1. Explain to students that scientists say that no matter where you live, you are affected by the earth's oceans. You have probably been affected by the oceans since you got up this morning. Ask students to react to this statement—does it make sense to them? Can they think of any evidence to support or refute this claim? Tell students they will be looking at this statement in the lesson they are about to do.

2. Provide students with copies of Handout 8-1 or with access to the Internet to explore the Smithsonian's exhibit "Ocean Planet" online. We recommend beginning at the exhibit overview (http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/ocean_planet_summary_long.html); students can proceed from there to the exhibit home page, from which they can enter any room of the exhibit. Whichever approach you take, students should be charged with finding evidence of at least two ways in which the ocean affects people no matter where they live.

3. Allow students to share the results of their research, creating a class list of the ocean's influences on people on the chalkboard. Be sure that students mention the ocean's ability to store vast amounts of solar energy (in the form of heat) and capacity to distribute that energy around the planet through currents and accompanying atmospheric winds.

4. Give each student a copy of Handout 8-2. Direct students' attention to the map of ocean currents. Tell them that the map shows the relative temperatures of the currents—some are warmer than the waters surrounding them, others are cooler. Ask students to evaluate what relation exists between the temperature of the currents and their direction of flow. (Students should conclude that warmer currents flow from the equator to higher latitudes, while colder currents flow from the polar regions toward the equator.) This evaluation may be difficult for some students. You may wish to take representative warm and cold currents and ask students whether the water in each flows toward or away from the equator. Apply the same question to other currents to establish an understanding of the general pattern of current flow.

5. Remind students that the oceans are tremendous reservoirs of solar energy (in the form of heat) and that ocean currents move this energy around the globe. You may wish to give as an example the effects of the Gulf Stream on the climate of coastal Europe and North America.

6. Direct your students to the map of ocean trade and travel routes on Handout 8-2. Tell your students that well before there was much scientific understanding of ocean currents sailors used currents to navigate. Have students compare the trade and travel routes with the flow of ocean currents. What can they conclude from this comparison? (Trade and travel routes largely followed the flow of atmospheric winds and ocean currents.)

7. Tell your students that they will next be studying how ocean waters make the climate of coastal areas different from the climate of inland areas. Emphasize that first they will be examining data gathered by scientists across the world and then analyzing data from an experiment of their own.

8. Give each student a copy of Handout 8-3. Direct students to examine the temperature data from the representative cities, looking for patterns. (Answers may vary, but students should note that the ranges of temperatures are far more moderate in coastal areas). Be sure students recognize that cities of nearly identical latitude have widely varying temperature ranges. Explain that because it takes far more energy to change the temperature of water than that of air or land, water warms up and cools off much more slowly than either. As a result, the temperatures of inland areas tend to change more than the temperatures of coastal areas that are "insulated" by water. (Note that factors other than proximity to water also affect climate. The cities in this exercise were selected only to illustrate general differences between coastal and inland climates.)

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9. Ask students if they have ever observed that water and air cool and warm at different rates. (Answers may vary, but students may note that they have observed this phenomenon at a beach, in a pool, or in a bathtub.) Explain that the following experiment will determine how water and air differ in their capacity to hold heat. Fill two small jars with equal amounts of water at room temperature while leaving two other small jars filled with air. Divide the class into four groups of equal size and give each group a thermometer. Direct one group to place a jar of water in a cool, shaded spot. Have another group place a jar of water in direct sunlight. Follow this procedure for the groups with the air-filled jars. Next, tell students to place their thermometers in the jars and record the initial temperature on the handout. If possible, have students take temperature readings after 15, 30, 60, and 90 minutes, recording their results on the handout.

10. Ask a representative from each group to write its temperature results on the chalkboard. Then have students graph the results on the chalkboard, with temperature on the vertical axis and time on the horizontal. This exercise will allow you to compare the temperature of water to the temperature of air in both shade and sunlight (students can make two graphs or use different colored chalk for shade and sunlight). The graphs will demonstrate that water cools and warms more slowly than air.

11. Begin the next activity by telling students that the climatic effects of the ocean are not always moderating or favorable. Distribute Handout 8-4 and allow time for students to read it. Conduct a general discussion of the effects of El Niño. Stress that El Niño can divert the normal flow of the jet streams over North America, leading to milder winters over the north central United States and torrential rain over the southern United States.

12. Distribute Handout 8-5. Tell students that satellites enable scientists to collect vast amounts of weather information that would take decades to gather with ocean-going research vessels. Stress that scientists can use satellites to observe El Niño and can predict this event one season in advance. The two maps on Handout 8-5 are based on satellite data gathered during two different years. The data on one map represent an El Niño year, while the data on the other represent a non-El Niño year. Ask students to complete the maps by coloring in the ocean temperature bands according to the key provided. After the students have finished coloring the two maps, ask them to decide which represents an El Niño year. (Year 1) This may be difficult for some students. Suggest that they look to the coast of South Ameria. Warm waters offshore are a sure indication of an El Niño year.

13. Have students complete the second part of the handout, which asks them to determine which description of January weather events is for an El Niño year. (Year 2) Be sure students justify their answers with concrete examples of atypical weather events. Suggest that they look for weather conditions similar to the ones mentioned in Handout 8-4.

14. While 1982-1983 was a famous El Niño year, a more recent El Niño occurred in 1997-1998. Tell students they are going to be working in groups to conduct research to find examples of El Niño events in 1997-1998. Divide the class into small research teams and, whether students are to conduct the research using print library resources or the Internet, help them develop a search strategy. Each group is to find and document five effects of El Niño in 1997-1998. The results of their research can be presented in class discussion or through a visual display, such as a poster.

Extension/Enrichment:

1. Have students track temperatures in two coastal and noncoastal areas at similar latitudes over a period of months. Temperature information can be found in many local newspapers. At the end of the tracking period, have students analyze their data to see whether it supports the general statement that temperatures are more moderate in coastal areas.

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2. Students may be unaware of how many sea products are used in foods that they eat. Tell students that carrageenan, alinates, and beta carotene all come from seaweed. Ask them to check labels on foods in their home and identify at least five products that contain seaweed. How does this project reinforce the idea that the world's oceans affect people everywhere?

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AN OCEAN OF DIFFERENCE

In the complex recipe of earth's climate and weather, no ingredient is more important than the sun. Without its intense energy, life on our planet would be impossible. At an average distance of 93 million miles (150 million kilometers), only ½ billionth of the sun's energy reaches earth. Yet even that fraction of the sun's power is massive—totaling some 1.8×10^{14} kilowatts, or more than 300,000 times the electrical generating capacity of the United States!

Not all of that solar radiation reaches the surface of earth. Some energy is scattered by the atmosphere on its way to the surface or is reflected back by the clouds, leaving about 45 percent to complete the journey. This solar radiation is absorbed (as heat) in differing amounts by the various surfaces on earth. Land areas heat up quickly during the day and cool rapidly at night, radiating much of their energy back to space. Luckily, atmospheric gases such as carbon dioxide and water vapor retain certain types of radiation that warm the atmosphere. Scientists have termed this phenomenon the *greenhouse effect*.

As compared with the continents, the world's oceans absorb much more of the incoming solar radiation and reflect much less back to space. That is because water has a higher *heat capacity* (holds more heat per unit volume) than land or air. Not surprisingly, the oceans' higher heat capacity directly affects the climate of our planet. The insulating effect of water gives coastal areas a more moderate range of temperatures than inland areas have at the same latitude.

The energy from the sun (in the form of heat) fuels the circulation of earth's atmosphere. Regions near the equator receive more heat than those near the poles. Warmer, lighter air rises at the equator while cooler, denser air sinks at the poles. This sets up a pole-to-equator movement of air at the surface and an equator-to-pole movement of air aloft, although actual atmospheric circulation is somewhat more complex. Because of Earth's rotation, atmospheric winds appear to be deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

Ocean Currents—Going with the Flow

The circulation of the world's oceans generally mirrors the movements of the atmosphere. Surface currents driven by atmospheric winds move warm equatorial waters to the poles and cold polar waters toward the equator—setting up nearly circular patterns of movement known as *gyres*. Before steam-powered ships were introduced in the 19th century, sailors used these winds and currents to cross vast stretches of ocean. Many of the routes they took, such as those between Europe and America, were physically longer than the trade routes used today. Rather than setting out directly west from Europe, sailors moved parallel to the west coasts of Europe and North Africa until they reached the "trade winds" that carried them westward across the Atlantic to the Caribbean.

Today scientists recognize that ocean currents are more than natural highways of commerce. These massive movements of ocean water play a pivotal role in determining the cli-

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mate of earth, although their behavior is not entirely understood. And, of the myriad currents flowing through the open ocean and along the edges of continents, the Gulf Stream may have the greatest influence on climate.

This swift-moving current transports more than 100 times the outflow of all the world's rivers as it moves northeastward from Cuba to Newfoundland. Caribbean heat continues eastward (in the form of the North Atlantic Drift), greatly moderating the coastal European climate. Much of Britain, the southern parts of which lie north of the U.S.-Canadian border, experiences winters as mild as those of northern Florida, Georgia, and South Carolina, which are 15 to 20 degrees in latitude further south!

The counterpart to the Gulf Stream in the Pacific is the Kuroshio (or Japan) Current, which moves from the Philippines northward past Taiwan and Japan. Overall, the climatic effects of the Kuroshio Current are less extensive than those of the Gulf Stream. Towering mountain ranges along the west coast of North America confine the effects of the current's waters to relatively small areas.

Other, similar currents affect climate on the rest of the planet. The relatively cold California, Peru, Benguela, and Canary Currents flow around the west coasts of the Americas, Africa, and Europe, creating cool, moist surface air with frequent fog and overcast skies.

Tomorrow's Forecast

Every day scientists gather vast amounts of data about the world's oceans from earth-orbiting satellites, ocean-traversing research vessels, and drifting buoys. Advanced computer models process this raw data, helping scientists to forecast not only the probability of common weather systems but also the dramatic effects of El Niño. These efforts have been so successful that individuals, corporations, and governments alike have come to depend on weather and climate forecasts to make critical choices. Whether it's a decision to plant more or less of a crop, to import or export a product, or to invest in a developing technology, the ocean is an important factor.

Yet there is still much to be learned about the complex interactions between the ocean and atmosphere in determining our planet's weather. The ocean and atmosphere are so intertwined that it is often unclear which is driving the other at any given time. However, whatever the process, the ocean will always play an important role in tomorrow's weather.

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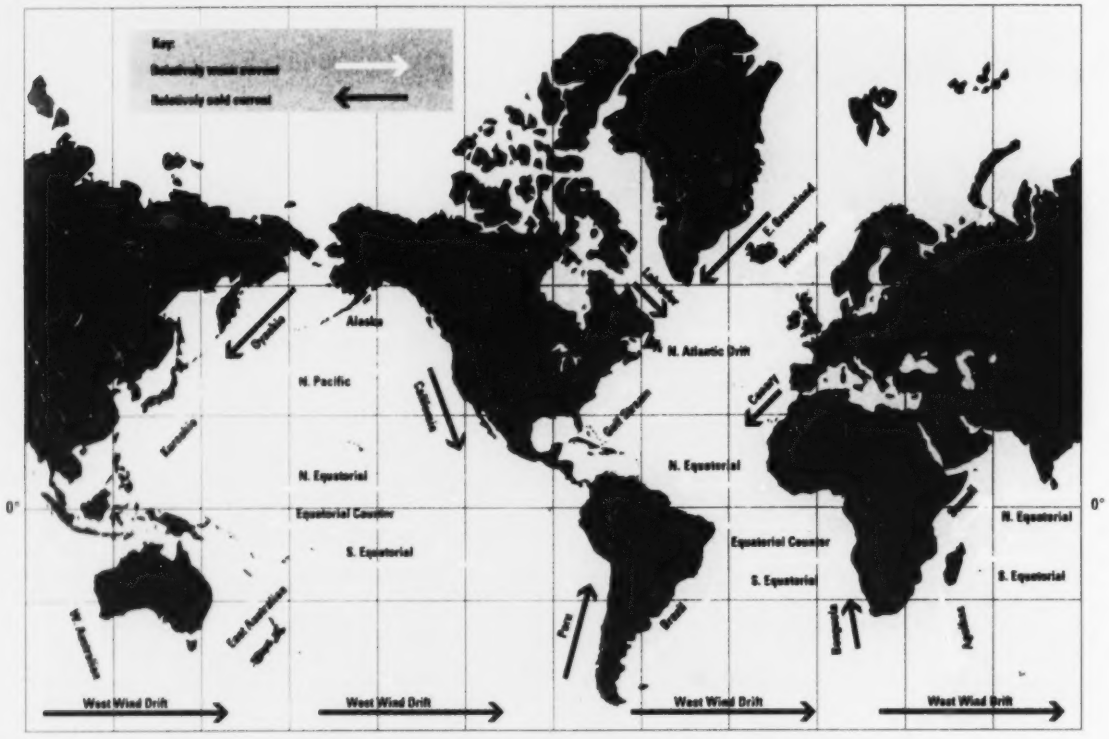
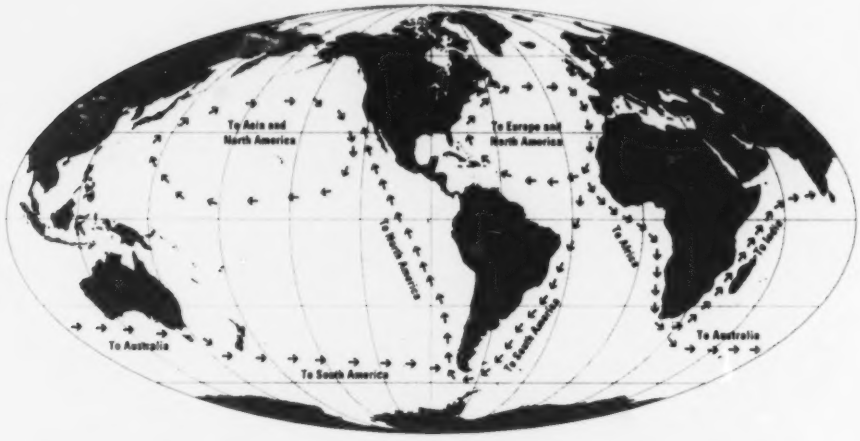
OCEAN CURRENTS



Major Ocean Currents and Their Relative Temperatures



Selected Ocean Trade Routes Prior to Mechanical Propulsion

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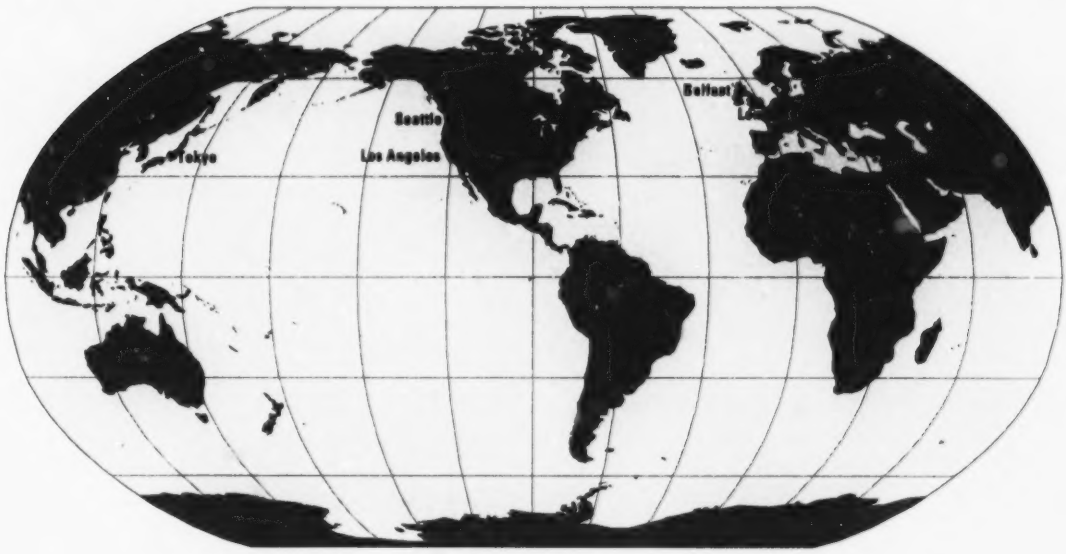
COASTAL CLIMATES, INLAND CLIMATES



Selected Inland and Coastal Cities

Highs and Lows, Coastal vs. Inland			
City	January (low)	**July (high)**	**Latitude (°N)**
Los Angeles	64°F (18°C)	81°F (27°C)	34.0°
Little Rock	50°F (10°C)	90°F (32°C)	34.5°
Seattle	41°F (5°C)	72°F (22°C)	47.5°
Bismarck	18°F (-8°C)	82°F (28°C)	47.0°
London	45°F (7°C)	73°F (23°C)	51.5°
Warsaw	32°F (0°C)	75°F (24°C)	52.5°
Belfast	43°F (6°C)	64°F (18°C)	54.0°
Moscow	16°F (-9°C)	73°F (23°C)	56.0°
Tokyo	46°F (8°C)	82°F (28°C)	35.0°
Kabul	36°F (2°C)	88°F (31°C)	35.0°
Beirut	63°F (17°C)	90°F (32°C)	34.0°

Log of Experiment Results	
Jar of ❑ air ❑ water (check one)	
Time (minutes)	Temperature

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EL NIÑO—AN OCEAN CHILD

Not all ocean waters have a moderating effect on weather and climate. A massive ocean-atmosphere interaction in the tropical Pacific known as El Niño has brought about climatic devastation worldwide. The term *El Niño* (Spanish for "the Christ Child") was coined more than a century ago by Peruvian and Ecuadorian fishermen who noted that in some years a warm ocean current appeared during the Christmas season and lasted for several months.

The fishermen noticed because when the warm waters were present, fish were less abundant, threatening their livelihood. Even worse, they encountered heavy rains and flooding.

Scientists now understand that these fishermen were observing part of El Niño. The strongest El Niño event of this century occurred from 1982 to 1983 and has been blamed for $8 billion in damage worldwide. Climatic effects of this El Niño included drought and brush fires in Australia, Indonesia, southern India, and parts of Africa and Brazil. In contrast, heavy rains fell along the equator, in Southern California, and the southeastern United States, while winter temperatures soared far above normal in the interior of Canada.

While scientists do not entirely understand the causes of El Niño, they believe that it is linked to dramatic atmospheric changes that typically occur over the North Pacific every two to seven years. In normal years, prevailing winds blowing from the east help to push earth's warmest ocean water into the western Pacific. For reasons that aren't clear, occasionally the prevailing winds weaken and the warm water begins to move eastward across the Pacific toward South America—starting El Niño.

El Niño's effects extend far beyond the South American coast. Storm systems that would normally have been kept farther west by the prevailing winds move into the central equatorial Pacific, bringing heavy rain to typically dry islands. These heavy storm systems further disrupt the normal flow of the *jet streams* across the Northern Hemisphere.

In any El Niño year the polar jet stream shifts northward over western North America, resulting in mild winters over western Canada and the north central United States. At the same time the subtropical jet stream is more vigorous than normal, bringing heavy rainfall to the southern United States.

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FIND EL NIÑO

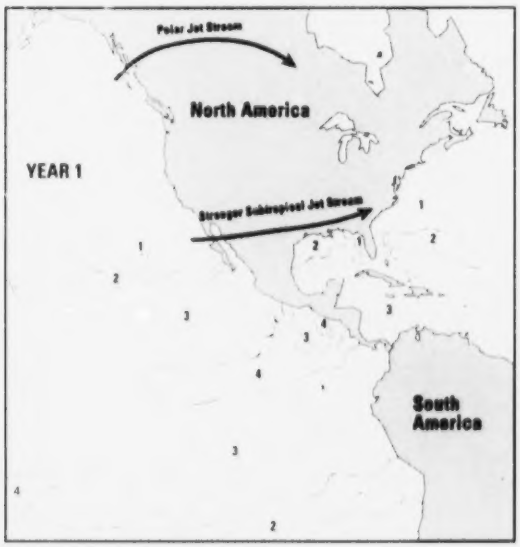
Part A: Sea-Surface Temperatures and Jet Streams Based on Satellite Images

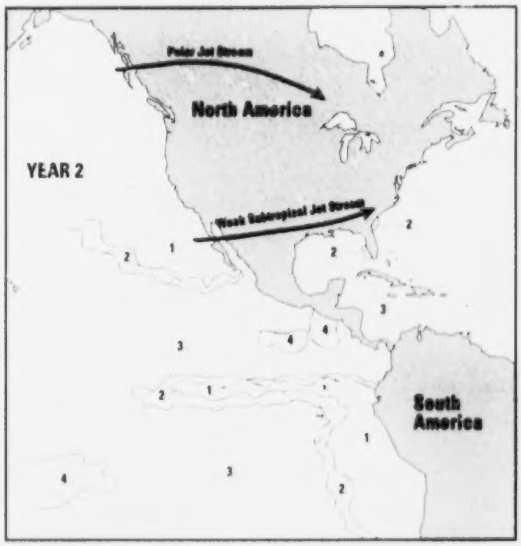
Directions: Color the numbered areas according to the key. Which is the El Niño year?

Key
1=Green
2=Yellow
3=Orange
4=Red

Colder

Warmer





Part B: January World Weather Roundup

Directions: Interpret these weather clues. Which is the El Niño year?

YEAR 1

Northeastern U.S.
High temperatures ranging from 25° to 30°F (-4° to -1°C)

Southeastern U.S.
High temperatures ranging from 45° to 50°F (8° to 10°C)

Western U.S. (coastal)
Mild, rainy

South America
Mild, cool waters offshore

India
Periods of rain with intermittent sunshine

Southern Africa
Periods of rain with intermittent sunshine

YEAR 2

Northeastern U.S.
High temperatures ranging from 45° to 50°F (8° to 10°C)

Southeastern U.S.
Heavy rains and flooding

Western U.S. (coastal)
Severe storms

South America
Heavy rain and flooding in Peru and Ecuador

India
Dry, drought conditions

Southern Africa
Dry, drought conditions

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9. Who Fits Here?

Overview:

Each environment is suitable to those life forms that have adapted to its climate, soils, water, vegetation, other life forms, and to other ecological factors over a number of years. Plants and animals tolerant of heat and little moisture are adapted to the desert; mountain goats to craggy hillsides and cold temperatures; and polar bears to ice fields and snowy vistas.

In this lesson, students research particular environments to discover characteristic life forms, and then match those animals' adaptations back to the appropriate environment. The major purpose of this lesson is for students to recognize that each environment has characteristic life forms, adapted to life there.

Objectives: At the end of this lesson, students will be able to:

1. Identify characteristic life forms in ecosystems.
2. Match appropriate life forms to ecosystems.
3. Generalize that each ecosystem has characteristic life forms, adapted to life there.

Standards Addressed: 4, 5, **8**

Themes Addressed: Place, Region

Time Required: 2+ class periods

Materials and Preparation: You will need posterboard for ten posters; crayons, paints, or magazine photos for posters; posterboard, index cards, or construction paper for 50 adaptation cards.

Procedure:

1. Divide the class into two equal groups. Explain that each group will make a game for the other. The object of the game will be to match animals to the ecosystem in which they life. Review with the class what is meant by the term *ecosystem*—a system formed by the interaction of living things with each other and the physical environment in which they live.

2. Ask each half of the class to choose five ecosystems they would like to know more about—e.g., desert, hardwood forest, coniferous forest, alpine, marine. Divide each half of the class into the five groups, one per ecosystem. Have each group research their ecosystem, learning its characteristic life forms including adaptations of the animals that enable them to survive in that environment.

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3. Ask each student group to make a poster showing the characteristic vegetation, terrain, etc., in the ecosystem they are studying. Posters of each ecosystem can be made with crayons and paints or magazine cut-outs.

4. For each ecosystem, students should make five cards, one for each of five species of animals characteristic of the ecosystem. Give students these directions: Put a description of the animal's adaptations to its environment on one side of the card, and a coding number on the other side, so that the animal described can be identified later. Do not write the name of the animal on the card. The cards should describe adaptations that enable the animals to survive in the ecosystem.

For example, for the desert environment, the five cards could read:

> "Hunts at night for warm rodents and sleeping birds; can climb loose, sloping sand by throwing loops of its body up like coils." (sidewinder rattlesnake)
>
> "Relies on agility and speed to escape predators; needs little water; gets water from plants it eats." (cottontail rabbit)
>
> "Hunts at night; lives in burrows of animals like gophers." (burrowing owl)
>
> "A bird which hibernates in winter to avoid desert cold." (nightjar)
>
> "Larvae feed on yucca flowers." (yucca moth)

5. When posters have been made and cards completed, students in each half of the class should make a master file of the five ecosystems and animals their cards represent. Next, they shuffle all their cards for their five ecosystems together into one pile.

6. Each half of the class then exchanges posters and cards with the other half.

7. Each half of the class then tries as a group to decide to which ecosystem each card belongs.

8. Next give each half of the class the master list for their posters. One student per group can read off the animals that correspond with each card for each poster.

9. Has each animal been placed in its proper ecosystem? If not, why? Were there any animals found in more than one ecosystem? Are these ecosystems varied? How can some animals live in more than one ecosystem, and not others? What are similarities and differences among the ecosystems and characteristic life forms? What are some of the most interesting animal adaptations? What functions do these adaptations serve? How do they relate to the nature of the physical environment? Ask the students what characterizes animals and the environments in which they live. (Each environment has characteristic life forms. These animals and plants are adapted to live where they do.)

10. As an assessment activity, have each student pick any three animals and describe the ecosystem in which each animal lives, including identification of the animal's habitat requirements. Students should also describe the importance of adaptation in animals.

Extension/Enrichment:

1. Have students look for rare, threatened, and endangered species in each ecosystem. Are there any? If not, why not? If yes, why? (Usually habitat loss)

2. Assign students to compare and contrast additional ecosystems and life forms from a variety of places on the planet.

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10. Biodiversity

Overview:

Every day, around the globe, species are lost; others are sentenced to extinction. The earth's biological diversity is more threatened today than at any other time in the past 65 million years. This lesson examines the importance of biodiversity, looks at why it is threatened, and suggests ways of conserving biodiversity.

The lesson begins with a case study highlighting a Costa Rican program to catalog the country's biodiversity. The symptoms of biodiversity loss are identified, as well as underlying causes. After a consideration of why we should be concerned about biodiversity loss, the lesson concludes with strategies to conserve biodiversity.

Objectives: At the end of this lesson, students will be able to:

1. Define *biodiversity* and give examples.
2. List ways in which biodiversity is threatened.
3. Distinguish between immediate causes and root causes of biodiversity loss.
4. Communicate reasons why biodiversity is valuable and should be preserved.
5. Identify actions they can take to help preserve biodiversity.

Standards Addressed: 4, 8, 14, 19

Themes Addressed: Place, Relationships within Places, Regions

Time Required: 2 class periods

Materials and Preparation: Make copies of Handouts 10-1, 10-2, 10-3, and 10-4 for all students. Use the masters provided to make transparencies. You will also need an overhead projector and a large map of the Western Hemisphere. Before beginning this lesson, you might want to have students research some of the extinct birds and animals and the causes for extinction. An excellent source is David Day's *Vanished Species* (New York: Gallery Books, 1989).

Adapted from Lesson 4, "Biodiversity," *Teacher's Guide to World Resources 1992-93* (Washington, DC: World Resources Institute, 1992), pp. 69-86. Reprinted with permission of the World Resources Institute.

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Procedure:

1. Distribute copies of Handout 10-1. Explain that this exercise is designed as a pretest, to measure what students know before studying the topic. Allow time for students to complete the exercise (about 10 minutes).

Tell students they can change their answers later if they want to. After completing this lesson, students can go back to their original answers to see what they have learned. Handout 10-4 is an answer sheet.

2. Distribute copies of Handouts 10-2 and 10-3. Use a map to show the location of Costa Rica. Allow students time to read the case study. Use the following questions from Handout 10-3 to discuss the case study:

- What is biological diversity or biodiversity? (The variety among living organisms and the ecological communities they inhabit. The INBIO case study discusses one type of biodiversity, species diversity: the variety of species within a region. There are two other types: genetic diversity—the variation of genes within a species, and ecosystem diversity—differences among groups of organisms in different physical settings; these types of biodiversity are not examined in this lesson.)
- What is the purpose of this national biodiversity survey? (The purpose is to catalog on computer all species, giving information about name, location, conservation status, and potential commercial uses.)
- How do "parataxonomists" differ from taxonomists? (Taxonomists are scientists who specialize in identifying and classifying species. "Parataxonomists" are local people—farmers, ranchers, high school students, etc.—who have received special training to assist the taxonomists by doing the collecting and preliminary identification.)
- Why is the INBIO survey using "parataxonomists"? (Because there are few taxonomists and many thousands of species to collect and identify.)
- Why is Merck & Co. paying $1 million to fund the biodiversity study? (Merck has successfully developed pharmaceuticals from natural sources and is looking for potential drugs in the plant, insect, and microbe samples from the INBIO study.)
- If any medicines are developed, will this help efforts to conserve the Costa Rican forests? (Yes. Rather than harvesting the forests, Merck will synthesize the chemical compounds in the laboratory. Any money that Merck makes from selling the medicines will be shared with Costa Rica. This money—royalties—and part of Merck's initial funding will be used to conserve biological diversity in the Costa Rican National system of Conservation Areas.)
- How likely is it that this project will yield new medicines? (No one can predict the success. However, approximately one-fourth of all prescriptions dispensed in the United States are derived from plants. Three-quarters of the world's people depend on traditional medicines derived from plants. Some plants have yielded important drugs—the rosy periwinkle from Madagascar yields a substance used to treat childhood leukemia, for example. Pharmaceutical houses now have rapid, automated screening equipment that speeds up research on plants. Once a promising substance has been identified, chemists try to synthesize it in the laboratory, as is being done currently with the taxol molecule from the Pacific yew tree.)

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- If you and other students were to conduct similar collecting trips in local habitats (forests, wetlands, etc.), would you be likely to find as many new species as the INBIO collectors? (No. The INBIO collectors are working in the tropical forests, which are richer in species than any other habitat. Closed tropical forests contain at least 50 percent and perhaps 90 percent of the world's species.)

3. Next, focus on loss of biodiversity—the extinction of species or loss of unique habitats and ecosystems or reduction of genetic variations within a species. Ask students to give some examples of species that have become extinct. Famous examples are the passenger pigeon and the dodo. Ask students to name animals or birds that are currently threatened with extinction: the California condor, the giant panda, the golden lion tamarin, and others. In the past, many species have become extinct. What is new today is the large numbers that are threatened and the rapid pace of extinction. Continued loss or degradation of habitats at the present rate could doom up to 15 percent of the earth's species over the next 25 years.

4. Tell students that it is extremely difficult to measure loss of biodiversity. Take one kind of biodiversity—species diversity. First of all, the total number of species is unknown. Show a transparency made from Overhead Master 10-1. The total of 10 million species is an estimate—biologists think there are between 5 million and 30 million species. Secondly, many species are tiny and inconspicuous: microbes, insects, and sea creatures. Thirdly, many species live in remote or inaccessible areas. Some species may be known by local people but have never been studied and named by scientists.

Another kind of biodiversity, the variation of genes within a species, is sometimes easier to measure, at least for species grown for food. There are some records of the loss of genetic diversity. For example, according to the U.S. Department of Agriculture, of more than 7,000 apple varieties in use between 1804 and 1904 in the United States, 86 percent have been lost; of 2,683 pear varieties, 88 percent are no longer available through seed banks.

5. Explain that one way to estimate biodiversity loss is to measure loss of specific habitats. Show a transparency made from Overhead Master 10-2. The graph shows that the United States and several other European countries have lost substantial portions of their wetlands in just 30 years. Ask: As wetlands disappear, what kinds of species are likely to be lost? (Wetlands, particularly along the coasts, are habitats for waterfowl and valuable breeding and nursery grounds for fish and shellfish.) Other habitats are threatened: islands with unique species, such as Madagascar and Hawaii; freshwater lakes; mangroves; and coral reefs. Coral reefs are habitats as biotically rich as tropical forests, but they are under severe pressure from pollution, soil erosion, and possibly global climate change.

6. The loss of forest habitat has probably received the most publicity. Show a transparency made from Overhead Master 10-3. Point out the decline of temperate forests in northern countries, and tropical forests of Southeast Asia, tropical Latin America, and central and west-central Africa. Explain that it is difficult to measure deforestation (or other forms of habitat loss) precisely. Recent studies of global deforestation are based in part on satellite images, but there are difficulties in collecting data, and all figures are estimates.

To estimate how many species are affected by loss of habitats, scientists take into account the relationships between the size of an area and the number of known species it holds. For example, a recent analysis of tropical forest habitat (which contains 50 to 90 percent of the world's species) concluded that at current rates of deforestation, 4 to 8 percent of rainforest species would be sentenced to extinction by 2015 and 17 to 35 percent by 2040. "Sentenced to extinction" means that the species is likely to lose the ability to breed and reproduce in the future. It lacks the habitat, food sources, or breeding conditions that are necessary for a viable population of the species.

7. Discuss other threats to biodiversity. They include:

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- *Alteration and fragmentation of habitat.* For example, in North America, the breakup of contiguous forests has seriously harmed many populations of songbirds.
- *Overexploitation of plant and animal species.* Many species are overexploited for our food and shelter, but the search for precious commodities, such as ivory, and for pets, curiosities, and collector's items has threatened other species as well.
- *Pollution of soil, water, and atmosphere.*
- *Introduction of nonnative species.* New species can crowd out native species. For example, on Guam, the brown tree snake has caused the extinction of three of the island's five endemic bird species and has nearly eliminated the other two.
- *Industrial agriculture and forestry.* Modern plant breeding programs have led to fewer varieties of crops. In the Green Revolution, farmers abandoned traditional varieties of crops in favor of higher-yielding new varieties. A tree plantation that consists of one species of tree is very different from a diverse forest ecosystem.
- *Global climate change.* If global warming occurs, species that cannot adjust to warmer temperatures are likely to become extinct.

8. Explain that habitat loss is an immediate cause of biodiversity loss, but any strategy to preserve biodiversity must take into account the underlying or root causes. Again, show a transparency made from Overhead Master 10-3. This time, focus on the population increase since 1900 and the connection between this increase and deforestation. The graph clearly shows two root causes of biodiversity loss: (1) population growth and (2) increasing consumption of resources. Ask:

- Why have the world's forests decreased as the population increases? (Forests have been cut down so that the land can be used for agriculture. There is an increasing demand for timber, for everything from chopsticks and paper to housing and furniture. Wood is the major source of energy in the developing countries, whose populations are increasing most rapidly.)
- Are these trends likely to continue? (Yes, the world population will probably double over the next 50 years. This will greatly increase the pressure on forests and other renewable resources.)
- How do population growth and increasing resource consumption affect biodiversity? (These trends pressure humans to convert wildlife habitat into agricultural and urban land. Remind students of change they have seen in your community, as woods and fields are converted to housing developments, roads, shopping centers, schools, etc. These trends produce wastes that pollute habitat and poison wildlife.)

9. Discuss other causes of biodiversity loss:

- *Ignorance about species and ecosystems.* A species may be lost because we didn't know it existed at a site that was developed. In some cases, a species may be known locally but the knowledge may die out as traditional ways of life change.
- *Government policies.* For example, policies that encourage agriculture or forestry can destroy biodiversity.
- *Effects of global trading systems.* The trend is toward specialization. Developing countries concentrate on certain crops such as coffee or bananas. As the number of crop species declines, so does the complex system of supporting species such as insects that pollinate the crops. Creation of large plantations also destroys species-rich forests and wetlands.

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- *Inequity of resource distribution.* Local communities who depend on land and biotic resources (for example, indigenous peoples of the rainforest) don't control the resources. Richer countries have technology and money to develop and exploit the natural resources of poor countries. Also, most poor countries are heavily in debt.
- *Value of biodiversity is ignored.* Biodiversity's value isn't recognized. For example, the value of nontimber goods the forest provides—the fruits, nuts, resins, oils, subsistence food, and fuelwood—are ignored in economic assessments of forest use, but studies show their value may far exceed that of the timber.

10. Examine how these root causes of biodiversity loss interact. For example, in Asia, the global market for shrimp has encouraged national governments to create policies favoring investment in shrimp farming. To do this, coastal mangrove swamps, an important habitat for fish, have been destroyed. Shrimp farming uses up fresh-water resources and pollutes the water, which is flushed into mangroves. Costs of the habitat loss are paid by local people who depend on the mangrove ecosystems for fish protein, revenue, and forest materials.

11. Organize the class into small groups and ask them to consider why we should be concerned about loss of biodiversity. Answers to this question can be developed along several different lines:

- *Aesthetic.* Each species and ecosystem adds to the richness and beauty of life on earth. Once a species becomes extinct, it is gone forever. When an ecosystem is destroyed, it is either impossible or extremely difficult to recreate it.
- *Ethical.* Each species is unique and has a right to exist. Each species is worthy of respect regardless of its worth to human beings. This point of view was recognized in the World Charter for Nature, adopted by the United Nations in 1982.
- *Economic.* Each species is of potential value to humans—as are healthy ecosystems. The global collection of genes, species, habitats, and ecosystems is a treasure trove that provides for human needs now and is essential for human survival in the future. Humans depend on other species for all of their food and many medicines and industrial products. Humans also depend on the intricate functioning of other species to provide "ecological services" such as purifying water, cycling nutrients, and breaking down pollutants. Genetic diversity is important in breeding crops and livestock. The loss of crop species has severe implications for global food security. Crop breeders need a diversity of crop varieties in order to breed new varieties that resist evolving pests and diseases. Many crops have been "rescued" with genetic material from wild relatives or traditional varieties.
- *Ecological.* Species evolve to fill particular niches or habitats. Many species depend on each other in intricate ways for survival. Destroying one species can lead to further extinctions or changes. No one can be sure where we begin the road to no return. With each extinction, life on the planet gets closer to extinction.

12. Explain that to develop strategies for conserving biodiversity, choices must be made. Where to begin? What is most important to save? There are three basic elements of conserving biodiversity: (a) save it; (b) study it; and (c) use it sustainably and equitably.

Write these three approaches on the chalkboard. Then, ask students to take another look at the case study in Handout 10-3. Can students identify these three approaches?

- The program focuses on identifying and studying the country's biological diversity.

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- The government has set up a national system of conservation areas to preserve biodiversity. Part of Merck's $1 million initial payment and future royalties will go to fund the conservation areas.

The INBIO program shows that loss of biodiversity is not a hopeless, inevitable situation. There are many things that can be done—by individuals, by local and national governments, by nations working together, and by citizen action.

13. Again working in their groups, have students consider how they can study, save, and use biodiversity:

- What can students do to study biodiversity? (Take courses in school; subscribe to magazines; attend education programs at local museums, zoos, nature centers, etc.; watch television programs.)
- What can students do to save biodiversity? (They could join a local citizen action group or form a new one in the school community; join and support local, national, and international conservation organizations; work as a volunteer in a park or zoo; support laws that protect habitat—for example, zoning laws.)
- What can they do to use biodiversity sustainably and equitably? (They could make changes in their buying habits and lifestyle to reduce consumption of resources; they could recycle).

14. Finally, have students return to Handout 10-1. Using Handout 10-4, discuss answers with students. Which fact was most surprising? Ask students to tell how their initial ideas about biodiversity have changed over the course of the lesson.

Extension/Enrichment:

1. Ask students to see how many varieties of apples they can name. Tell them that at the beginning of this century, there were more than 7,000 apple varieties in use in the United States; today, 85 percent of these have been lost. Have students bring to class as many different kinds of apples as they can find. Discuss how the different kinds vary in size, color, shape, and taste. Ask students to consider why a few varieties have become so popular. Why do we need many varieties? Is it important to preserve rare varieties? For example, Seed Savers Exchange in Decorah, Iowa, is developing an orchard to preserve 500 old-time apple varieties. Explore how new varieties of apples are developed.

2. Tropical rain forests are characterized by an amazing number of different plant species. A tract less than 2½ acres (1 hectare) of Peru's Amazon forest contained 275 species of trees. In a study of 120 square acres (100 square meters) of lowland tropical rain forest in Costa Rica, 223 species of vascular plants were counted. A tract of woodland in a temperate area in the United States has many fewer species. To illustrate this contrast, have the class take a census of a tract of woodland near you. Develop a plan to record the different species of trees, using guidebooks and other materials to help identify them. If possible, record bushes, flowering plants, grasses, and other species. Have students summarize their findings and make generalizations about the number and types of plant species found.

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TEST YOURSELF: HOW MUCH DO YOU KNOW ABOUT BIODIVERSITY?

Mark **T** in front of each statement you believe is true. Mark **F** in front of each statement you believe is false.

_____1. The total number of species is not known.

_____2. More than one-half of the world's species live in tropical forests.

_____3. About 10 million species have been identified by scientists.

_____4. The earth has many more species than it needs.

_____5. Most species are of no direct benefit to humans.

_____6. Biological diversity is more threatened now than at any time in the past 65 million years.

_____7. The loss of forests, wetlands, grasslands, and other habitats contributes to loss of biodiversity.

_____8. Many species become extinct without ever being identified.

_____9. Large plants, birds, and mammals make up about half the world's species.

_____10. Coral reefs are as rich in biodiversity as tropical forests.

_____11. Many islands are home to species found nowhere else.

_____12. Fewer than 100 species currently provide most of the world's food supply.

_____13. Creating parks and zoos is the best way to preserve biodiversity.

_____14. The biological resources of developing countries are a potential source of income.

_____15. Two major causes of biodiversity loss are population growth and the increasing consumption of natural resources.

_____16. Once a species becomes endangered, it is doomed to extinction.

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FACTS ABOUT BIODIVERSITY

Tropical forests are a unique and endangered resource. They provide habitat for millions of plant and animal species, recycle nutrients, protect soils and watersheds, and provide many products and services to people. These forests are being cleared rapidly, causing habitat destruction and extinction of species. Deforestation threatens biodiversity, a global resource made up of the variety of life forms on earth, both wild and domesticated.

State of the Forests

- About one-third of the world's land area is covered by forests.
- Just over one-half of the world's forests are in developing countries.
- New studies indicate the world is losing about 17 million hectares (an area four times the size of Switzerland) of tropical forests each year. Loss of forests is called deforestation.
- Causes of deforestation include permanent conversion to agricultural land; logging; demand for fuelwood, fodder, and other forest products; grazing; fire; and drought.
- Brazil has 30 percent of the world's tropical forests and the largest area of annual deforestation. The vast majority of trees cleared in the Amazon region are burned or left to rot when land is cleared for agriculture.
- Deforestation is second only to burning of fossil fuels as a human source of carbon dioxide, one of the major gases that may cause the global climate to warm.
- Deforestation leads to soil degradation and destroys habitat, leading to the extinction of plants, animals, birds, and insects.

State of the World's Habitat and Species

- The habitats richest in biodiversity are the tropical moist forests of Southeastern Asia, central and west-central Africa, and tropical Latin America. These forests, described as the global "hotspots," contain more than half of all species.
- At least half of the world's species are contained in just 7 percent of the world's land surface.
- The exact number of species on earth is not known. Less than 5 percent of species in the tropics have been identified. Worldwide, on average, about three new species of birds are found each year. An estimated 40 percent of freshwater fishes in South America have not yet been classified.
- More than 700 species of vertebrates, invertebrates, and vascular plants have become extinct since 1600, and untold numbers probably became extinct without ever being described.
- Only 5 percent of the world's land surface is in national protected areas. These include nature reserves, national parks and monuments, habitat and wildlife management areas, and protected landscapes.

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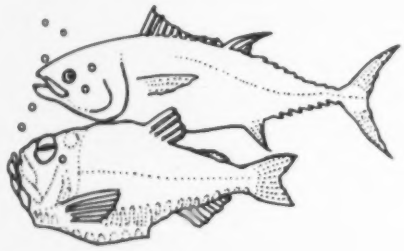
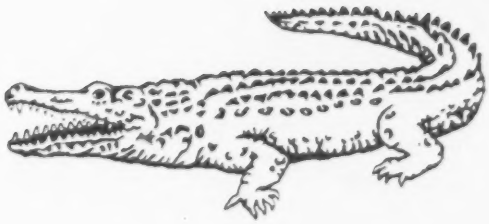
Trends

- The rate of deforestation is likely to increase, although in some areas there has been dramatic improvement.
- There is growing concern about destruction of the forests, especially the tropical rain forests.
- Wildlife habitat is threatened by humans and by the potential threat of climate change.
- The trade in animals and animal products is having devastating effects on some wildlife populations, such as elephants, parrots, and large reptiles.
- Global warming could lead to widespread extinctions because habitats would shift, shrink, or disappear.





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COLLECTING SPECIES DATA IN COSTA RICA

Costa Rica is a small country in Central America, located between Nicaragua and Panama. Once almost all the country was covered by forests. Now, most of the forests have been cleared for agriculture, but the Costa Rican government has set aside 25 percent of its land as forest preserve. These forests are rich in biological resources, and a Costa Rican research institute is experimenting with a new way to investigate these valuable resources: training local people to gather and classify specimens from the tropical forest.

A New Model for a National Biodiversity Survey

The Instituto Nacional de Biodiversidad (INBIO), founded in 1989 with the help of the national government, is a private nonprofit organization. It serves as a clearinghouse for information on and monitoring of Costa Rica's flora and fauna—between 500,000 and 1 million species in all—and has begun a comprehensive national survey of them. The name, location, conservation status, and potential commercial uses of each species are catalogued on computer. Using the catalogue, researchers can look for possible chemical uses among newly described wild plant species. Plants free of insect damage or fungal growth, for example, may contain natural chemicals that act as insect repellents, growth inhibitors, or antibiotics. Such finds are worth money to agrochemical, pharmaceutical, or biotechnology companies. For a fee, INBIO helps commercial users "prospect" in the catalogue. INBIO's first major customer was Merck & Co., Inc., the world's largest pharmaceutical company, which has a successful history of developing pharmaceuticals from natural sources. In exchange for plant, insect, and microbe samples from INBIO, Merck agreed to pay INBIO $1 million as well as royalties on the sale of any products that Merck ultimately develops. Both Merck and INBIO hope that useful chemicals found in samples could then be synthesized in the laboratory rather than harvested from the forest. Part of the research funding will go to the Costa Rican national system of Conservation Areas to conserve biological diversity.

Costa Rica (like many tropical countries) has a shortage of taxonomists—scientists who can identify and classify species. INBIO's solution is innovative: it hires and trains local people to act as field collectors and do initial identification of insect specimens for the national biodiversity survey. The first class of 16 "parataxonomists" went into the field in 1989 and are now collecting 100,000 insect specimens per month. During their first six months, they collected four times as many insect specimens as had been put into Costa Rica's national collections during the previous 100 years. The parataxonomists include former housewives, farmers, ranchers, high school students, and national park guards. The specimens are sent from the field to INBIO, where apprentice curators classify them. Finally, international experts are brought in to confirm identifications and make definitive taxonomic judgments.

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Questions

1. What is biological diversity or "biodiversity"?
2. What is the purpose of this national biodiversity survey?
3. How do "parataxonomists" differ from taxonomists?
4. Why is the INBIO survey using "parataxonomists"?
5. Why is Merck & Co. paying $1 million to fund the biodiversity study?
6. If any medicines are developed, will this help efforts to conserve the Costa Rican forests?
7. How likely is it that this project will yield new medicines?
8. If you and other students were to train as "parataxonomists" and conduct similar collecting trips in local habitats (forests, wetlands, etc.), would you be likely to find as many new species as the INBIO collectors?

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ANSWERS TO "HOW MUCH DO YOU KNOW ABOUT BIODIVERSITY?"

1. **True.** There may be as many as 30 million species, but scientists estimate there are about 10 million. Most of them are inconspicuous organisms, such as microbes, insects, and tiny sea creatures.

2. **True.** Over one-half of the world's species live in tropical moist forests.

3. **False.** It is estimated that fewer than 1.4 million of the world's species have been named. Most of the unidentified species live in the tropics. As we begin to explore other habitats, surprising discoveries are made. Scientists believe the deep sea floor could contain as many as a million undescribed species.

4. **False.** Species evolve to fill particular niches or habitats that exist on earth. Many species depend on each other in intricate ways for survival. Destroying one species can lead to further extinctions or changes.

5. **True** or **False.** We don't know. Scientists are often delighted to find a cure for a dreaded human disease in a lowly mold or obscure plant. It seems foolish to destroy our genetic storehouse before we have even taken inventory. Also, extinction of a species can upset the balance of a complex ecosystem.

6. **True.** Tropical deforestation is the main force behind this crisis. The destruction of wetlands, coral reefs, and temperate forests is also important.

7. **True.** As habitats are fragmented and destroyed, many species become extinct.

8. **True.** Habitats are destroyed without being studied. Ignorance about species and ecosystems contributes to species extinction.

9. **False.** Large, visible species of mammals, birds, and plants make up fewer than 5 percent of the world's species.

10. **True.** Coral reefs are habitats of unparalleled biotic richness.

11. **True.** Remote islands such as Hawaii have unique flora because evolution takes place there in isolation.

12. **True.** Fewer species are grown today than in the past. Genetic diversity is declining.

13. **False.** Zoos and parks are traditional strategies for protecting biodiversity and have helped preserve many species. However, newer strategies are needed to address the root causes of biodiversity loss.

14. **True.** As the INBIO study indicates, the vast genetic resources of tropical countries could become the "oil" of the 21st century.

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15. **True.** Other root causes are ignorance of species and ecosystems, poorly conceived policies (for example, those that favor deforestation), inequity in resource distribution, and the failure of economic systems to account for the value of biological resources.

16. **False.** Species can be protected by preserving habitat and by breeding and propagating programs in zoos and botanic gardens. But such efforts are expensive and limited in scope.

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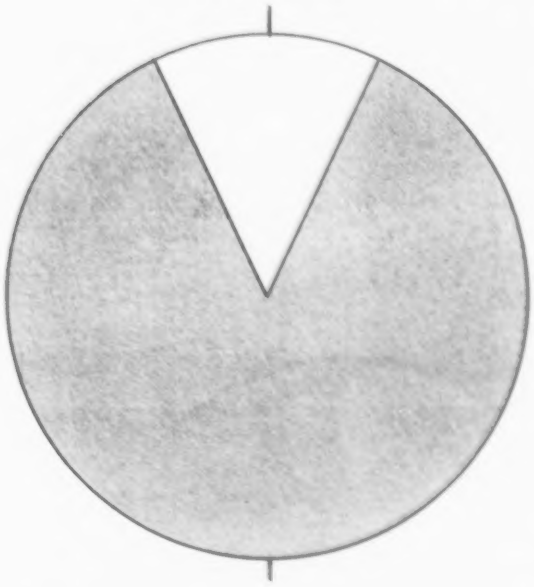
SPECIES REMAINING TO BE DESCRIBED

Described Species
1.4 Million



Species Remaining to be Described
8.6 Million

Estimated Total Species = 10 Million

Source: World Resources Institute, The World Conservation Union, and the United Nations Environment Programme, in consultation with the Food and Agriculture Organization and the United Nations Education, Scientific and Cultural Organization, *Global Biodiversity Strategy* (Washington, DC: World Resources Institute, 1992), p. 156.

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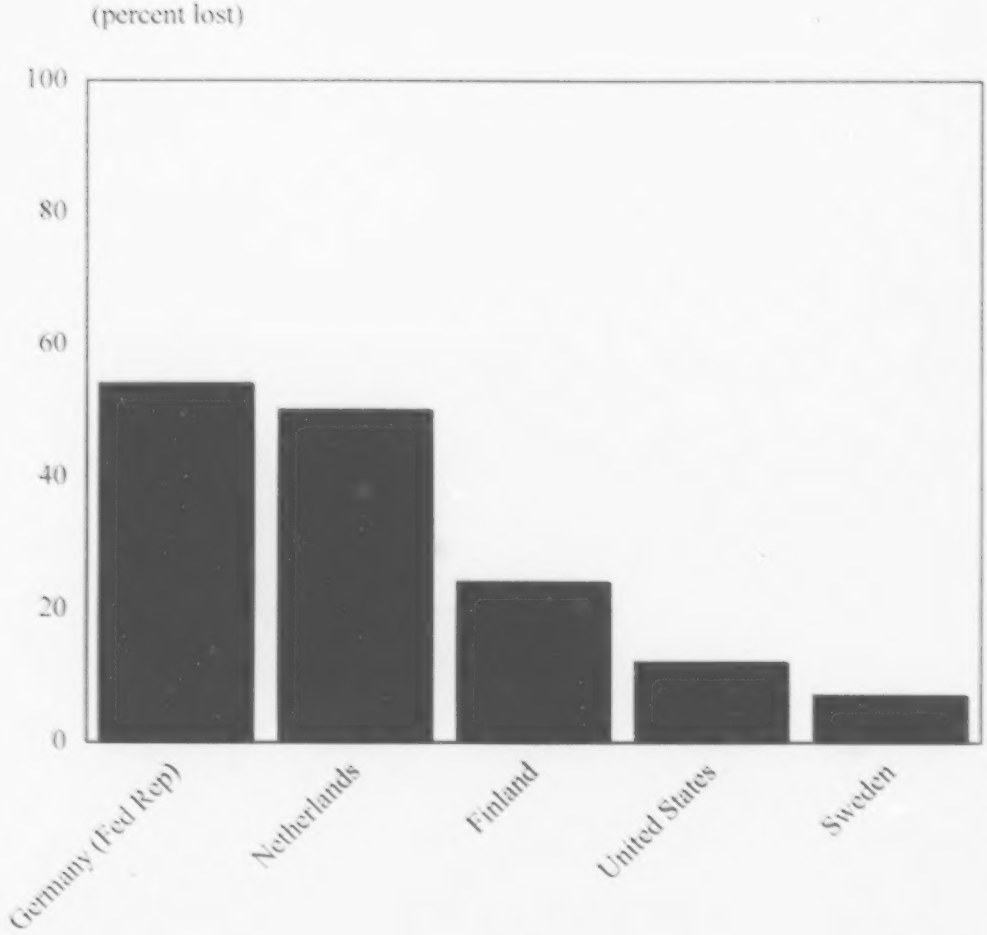
WETLAND LOSS IN SELECTED INDUSTRIALIZED COUNTRIES, 1950-80



Source: Organisation for Economic Co-operation and Development (OECD), *OECD Environmental Data Compendium 1991* (Paris: OECD, 1991), p. 75.

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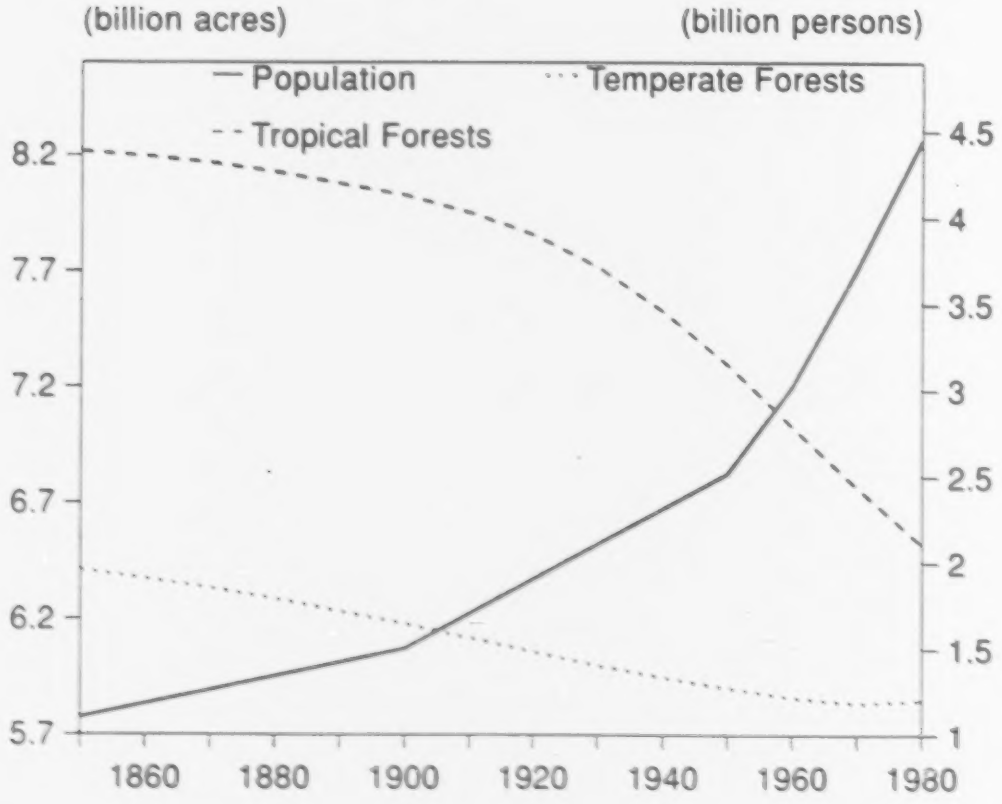
TRENDS IN DEFORESTATION AND POPULATION GROWTH, 1850-1980



Source: World Resources Institute and The International Institute for Environment and Development, *World Resources 1987* (New York: Basic Books, Inc., Table 18-3), p. 272.

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Active Teaching: Field Studies

Field experiences can make what students are learning in class more concrete and real, helping them make connections between school learning and their own lives. Simply because they take place outside the classroom, field experiences can be highly engaging activities. Teachers who use field experiences also report that they learn a great deal about their students as learners through this type of activity; observing how students interpret their experiences and how they link what is learned in the field with what is learned in the classroom and with their own everyday lives provides insights not gained in the course of more traditional classroom activities.

Many teachers may think of field experiences in terms of standard field trips (e.g., visiting a water treatment facility), which—if properly planned and structured—can be very valuable experiences. However, we would encourage teachers to think more broadly about such activities as observation at public meetings (e.g., attending a public hearing on land use) and opportunities for actual field study (e.g., gathering data at a landfill).

An article in ASCD's *Curriculum Update* (Winter 1997) describes several in-depth field studies. At the Rocky Mountain School of Expeditionary Learning in Denver, for example, second-grade students took part in an in-depth study of trees. Weekly, they traveled to a cemetery with many old trees. Among the activities they participated in were mapping the cemetery, charting seasonal changes in the trees, gathering botanical specimens, and studying mini-ecosystems.

The article also passes along the thinking of Meg Campbell, director of Expeditionary Learning Outward Bound at the Harvard Graduate School of Education, who suggests making field work "central to the creation of a major piece of student work. For example, students might visit an outdoor site repeatedly as they create field guides on topics such as pond life or marine ecology."

The Toyota Tapestry Awards, given annually to science teachers, focus on community-based learning. Many of the projects, although centered in science, address the geography standards. For example, consider these projects, which are described in *Improving Science Education with Community-Based Projects: Five Years of Toyota Tapestry Grants*:

- Teachers at Lenox (MA) Memorial Middle/High School planned a wetlands project that spanned the middle school grades and continued into high school biology. Linking the study of wetlands to science, social studies, math, and language arts, the teachers involved students in collecting baseline data, identifying potential threats to the future of the wetlands, and continuous monitoring of human impacts. Field study activities included a weeklong canoe trip and frequent visits to the wetlands. Students periodically report their findings to town officials.
- At Pike High School in Indianapolis, students learned about the effects of non-native species on the ecosystem and on human activities, particularly agriculture. They conducted field research on the presence of invasive species, investigated the adverse effects of these species, and worked with scientists and public officials to develop plans for dealing with these species.

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- Students at Sahuarita (AZ) High School had the opportunity to study the impact of a local industry on the environment in a project titled "Evaluation of a Copper Mine Tailing Operation on the Local Environment." Guest lecturers talked to students about mining and related environmental issues and students then toured the local mine. Using this information as a foundation, students did field work to test the effectiveness of various ways of suppressing dust known as mine tailings. They also tested the local water and soil to find out what effect tailings had already had on the environment.

These are only a few examples of the many projects described in this book, which can stimulate creative thinking by geography teachers.

To be successful, field studies require careful planning, in-class preparation, and debriefing. The following sections provide some brief tips for each of these phases, as well as for actually conducting the field study.

Planning

While it may seem obvious, it is worth noting that field study ***must*** support curriculum objectives. Thus, the first step in planning for field study is to review your curriculum goals and objectives for the year and determine what possible field studies might support those goals. In addition to considering which field studies would be most beneficial from a curriculum standpoint, you need to consider logistical details as well. Sometimes, costs or other logistical issues make a valuable site infeasible. Especially important factors to consider here are transportation costs and safety issues. Remember, however, that simple, inexpensive field studies can be just as valuable as more elaborate ones.

Once you have decided on a site, make an appointment and visit it yourself. Anticipate problems and think about possible solutions. If you will be away from school at lunch time, find out if students can eat at the site. If not, make appropriate plans.

Discuss your plans with the school principal to be sure that the planned date does not interfere with other school activities. Inform other school staff that will be affected by the trip (e.g., other teachers, cafeteria staff). Be sure that you know the proper procedures for handling medications students require during the day. Obtain all necessary permissions from the site owner, the school administration, and parents. Be sure that you have adequate help to supervise students.

Two other factors you may need to consider are what alternatives you will offer students who cannot—for whatever reason—participate in the field study and what you will do in case of bad weather.

In-Class Preparation

Preparing students for the field study is critical in ensuring that students understand proper behavior in the setting where they will be working, as well as in making the field study not just an experience, but a learning experience. Students should be briefed on rules that apply to the place where you will be working and should understand what to expect at the site (for example, a teacher taking students to an art museum felt it was necessary to prepare them to see nudes). Older students may develop their own set of standards for appropriate behavior. You may want to establish procedures for what to do if students become separated from the group and ensure that all students have a quarter to make a phone call in an emergency.

In terms of preparing students for the substance of the field study, be sure that they understand the objectives of the field experience and how it fits into the current unit of study. Prepare specific activities to students to complete while at the study site. For example, if students are to collect data, develop

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or help students develop a data collection form or a format for field notes. Many teachers prepare booklets with assignments for students to complete before, during, and after the field study. Immediately before leaving the classroom, make sure students have all the material needed.

Conducting the Field Study

During the field experience, circulate among groups. Show enthusiasm and participate in activities. Help students focus on the environment by using all their senses. Ask questions to help students observe and make comparisons.

Be sure students have time to complete the assignments you have given them. Having students work in groups during field experiences often proves successful. If the assignments are lengthy, group members can then divide the work among themselves in order to complete it on time. Not being able to complete their work will result in a great deal of frustration.

Debriefing

Be sure to allow time after the field experience for class discussion and follow-up. Examine with students what they observed and learned, how it relates to the in-class activities they had been doing before the field experience, and what questions remain to be answered. Follow-up visits or interviews, exhibitions of pictures taken on the trip along with other information gathered, or independent investigations of a similar kind may be planned as a means of extending the field experience.

With students, assess whether the field study was valuable. Ask students whether they think the field study achieved its purposes and to make suggestions for improvement. Students could also be asked to identify the strengths and weaknesses of the experience. Share the results of this assessment with the students, chaperones who went with the class, and with your principal. The evaluation results might be sent to the host site with a thank you letter for their assistance and cooperation.

Sources

Social studies teachers have historically not emphasized field studies as a teaching strategy. Consequently, we have not seen many prepared activities incorporating field studies. In science, however, field study has received greater emphasis. Since many field studies related to earth and life science topics need only minor adaptation to address the geography standards, we recommend *Science Scope*, the middle school journal of the National Science Teachers Association, as a source for field studies. A field study from that publication appears as Lesson 5 in this volume. Other field studies described in recent issues focused on invasive weeds, weather and the seasons, water quality, and erosion.

References

"Field Studies—Learning Thrives Beyond the Classroom," *ASCD Curriculum Update* (Winter 1997).

Rapp, Kathleen A., and Crystal Lal, eds., *Improving Science Education with Community-Based Projects: Five Years of Toyota Tapestry Grants* (Arlington, VA: National Science Teachers Association, 1996).

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HUMAN SYSTEMS

11. The More the Merrier?

Overview:

Human population growth has a variety of consequences, both direct and indirect. This introductory activity looks at one of those consequences easiest to see in daily life—crowding. With population growth, the average population density will increase, even if the population is denser in some places than others. Visualizing increased population density in a variety of environments can help us plan for the future. For example, in a place already densely populated, an increase can result in more crowding, traffic, waiting in lines, waiting lists, tighter clusters of houses, compact apartments, less space and a general sense of stress. In a mostly unpopulated place, a slight increase in population density can interrupt a previously uninterrupted horizon, reduce or fragment open space, and require new electrical wires and other services.

In the discussion following the brief demonstration, students can weigh the pros and cons of higher population densities. They explore the services that are enhanced by a higher population density as well as the challenges posed by increased crowding.

Objectives: At the end of this lesson, students will be able to:

1. Describe the effects of increases in population densities.
2. List situations in which population density is an advantage or disadvantage.
3. Investigate how life in major world cities is affected by population density.

Standards Addressed: 4, 9, 13, 16

Themes Addressed: Place, Relationship within Places

Time Required: 2 class periods

Materials and Preparation: Mark off an area in the classroom with masking tape, chalk, or furniture (about a 10 ft. X 10 ft. area). You should also gather reference materials for student use and arrange for them to conduct research on the Internet.

Procedure:

1. Have students imagine that the number of students in your classroom has doubled. Have them list the effects of this. Make sure that both positive and negative impacts are discussed. (Answers could include more friends, more ideas, more sharing, less space, crowding, more noise, competition for chairs and books, less attention from the teacher.)

Adapted from *People and the Planet: Lessons for a Sustainable Future*, edited by Pamela Wasserman (Washington, DC: Zero Population Growth, 1996).

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2. Select two students to stand in the marked-off area and do jumping jacks.

3. Keep doubling the number of students doing jumping jacks in the area until it becomes impossible to add more. If you find they have coordinated their arm movements, secretly ask one of the students to get out of synch.

4. Solicit observations from the original pair on how their environment and behavior changed.

5. Conduct a class discussion of the demonstration, using the following questions:

- Did the students jump in synch? Why did this happen? How did this happen? Does anything like this happen in the real world? (Coordination of movement is necessary in crowded events, they obey traffic signals and laws, etc.)
- What happened when one person was out of synch? What would happen if that occurred in the real world? (Have them imagine a person who always disobeyed traffic signals, wouldn't wait his/her turn, or wouldn't share.)
- List situations, events, and activities for which it is better to have a lot of people around, and those for which solitude is better. (Possible activities for large groups include parties, fiestas, family reunions, sports events, competitions, dances, walking on dark streets. It is often less desirable to have big crowds for classes, bicycling, shopping, driving, walking, thinking, drawing, studying, reading, sleeping, waiting for the bus, and private conversations.)
- If you had a paper delivery route, would you want it to be in an area with high population density or low population density? (In highly populated areas it would be easier to deliver more papers in a shorter amount of time, and therefore make more money. If the households were scattered farther apart, you might enjoy more fresh air and open scenery on your walk but you would not be able to deliver as many papers before you had to leave for school.)
- What other services are easier to provide in an area of high population density? (Possible answers might include mail delivery; electricity; telephone, cable, water, and sewer connections; door-to-door sales. Additionally, services centered in one building, like community hospitals, schools, libraries, etc., can be more convenient to people who live close.)
- What qualities are desirable about areas of lower population density? (Possible answers include more peaceful, open space, more space to plant gardens, fresher air, more nature, less noise, more space to cut loose or to get away.)
- If you had a cold, would more people be likely to catch it where population density was high or low? (Colds, like other contagious diseases, can pass more easily in areas of high population density. In the densely populated city of Tokyo, Japan, people wear face masks when they have a cold so as not to spread it.)
- If population continues to grow locally, what is the impact on population density? (If population grows, the density will become higher and/or some people may migrate to other areas.)
- Human migration can change the population density of an area relative to neighboring areas, as people move into or out of it. What might make a particular place more crowded and what might make a particular place less crowded, in the long term and in the short term? (Job possibilities, nice retirement areas, healthy climate for allergy sufferers, entertainment and cultural variety, better quality of life, and affordable housing are some reasons that areas become more crowded. Places where a major industry goes bust, where

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civil war breaks out, where job possibilities decline, or where taxes are too high tend to lose people.)

6. This activity shows that population densities impact crowding, amount of open space, delivery of services, and contagious disease. Discuss the secondary consequences of population density and the idea that populations require more resources than just land area to support them. When population density outstrips the ability of existing local resources to meet the needs of the population, people may want to leave in search of better places. This, in turn, changes the population density of both the place they leave and the new place in which they settle.

7. Ask students to identify the eight most popular cities in the world, using an almanac, atlas, or other reference materials. Divide the class into eight small groups and assign one city to each group. Tell the groups that their task is to find three pieces of evidence for how population density shapes the lifestyle in their city. They could find this information in reference materials or via the Internet. (Example: In Tokyo, the average highway speed is 10 miles per hour due to heavy traffic.)

8. Allow time for groups to share the evidence they have gathered. Conclude with a brief discussion summarizing the effects of increased population density.

Extension/Enrichment:

1. Students could create a bulletin board or posters displaying the evidence they have collected on the impact of higher population density.

2. The publication from which this lesson was adapted—*People and the Planet: Lessons for a Sustainable Future*, edited by Pamela Wasserman—presents 30 lessons related to population that could be used to extend the learning in this introductory lesson. The publication can be ordered from Zero Population Growth, 1400 16th Street, NW, Suite 320, Washington, DC 20036.

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12. The Great Migration

Overview:

Migration occurs for many reasons, including those termed *pushes* (factors causing people to leave one place) and *pulls* (factors drawing people to a place). The case of the massive migration from Southern states to Northern states by African Americans in the early 20th century illustrates this fact very well. Not only were black Americans pulled toward the North, primarily by jobs, but the repression and racism rampant in the South pushed them out. In this lesson, students examine Jacob Lawrence's series of paintings on the migration, as well as a poem written by Walter Dean Myers, to learn more about why so many African Americans left the South in the period 1916-1919.

Objectives: At the end of this lesson, students will be able to:

1. Explain push and pull factors in migration.

2. List reasons why African Americans left the South and moved North in the period 1916-1919.

3. Describe how migration changed the lives of the migrants as well as the nature of the places left and migrated to.

Standards Addressed: 6, 9

Themes Addressed: Place, Movement, Regions

Time Required: 1-2 class periods

Materials and Preparation: You will need several copies of *The Great Migration: An American Story*, by Jacob Lawrence (New York: HarperCollins, 1993). You will also need copies of Handouts 12-1 and 12-2 for all students. You may find it helpful to involve the art teacher in the lesson, so he/she can provide assistance to students in analyzing Lawrence's paintings.

Procedure:

1. Review or introduce the concept of *migration*—moving from one place to another. Point out that while we often read about migration from country to country in the newspaper, migration within countries is also important. Poll the class to find out how many students have moved at least 100 miles within their lifetimes. Point out that these students are among the many internal migrants in our country.

2. Explain that people who migrate have many reasons for doing so. Because of the difficulties involved in moving, the reasons are generally very important. Reasons are often categorized as pushes and pulls. Allow students to speculate on what pushes and pulls are before explaining that pushes are

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factors forcing a person to leave one area and pulls are factors drawing a person to another area. Ask students to give examples of pushes (famine, war, no jobs, etc.) and pulls (jobs, freedom).

3. Tell students that they are going to be using an unusual book to study one of the largest internal migrations in U.S. history—the movement of African Americans from the South to the North in the years 1916-1919. The book presents a series of 60 paintings done by an artist whose family was part of what is known as the Great Migration. Divide the class into small groups and give each group a copy of *The Great Migration* and several copies of Handout 12-1. The groups are to read the book, study the paintings, and discuss the questions on the handout. Allow time for the groups to do their work.

4. Conduct a whole-class discussion of the book, the handout questions, and students' responses to Lawrence's work. Point out that many of the migrants lived on farms or in small towns in the South but settled in large cities in the North. How might this add to the changes in their lives caused by migration? Also point out that the development of urban black communities in the North, especially in New York's Harlem, where blacks mingled with West Indians, other foreigners, and artistic whites, helped develop a sense of black pride. Black music—dixieland, ragtime, and other forms of jazz—became immensely popular. Black writers produced a large body of outstanding work. The general cultural movement was referred to as the Harlem Renaissance.

5. Next, read aloud the Walter Dean Myers poem at the end of the book. Discuss student responses to the poem, drawing out how the poem adds to their understanding of the Great Migration.

6. Ask students to speculate on whether black migration to the North continued after World War I ended and soldiers returned to their communities. Distribute Handout 12-2 and read it aloud with the class. Discuss the following questions:

- Why, according to DuBois, should blacks leave the South? What were the advantages of living in the North?
- How did Dubois think the decreased immigration from Europe would affect blacks?
- Would you have moved North if you had been a black Southerner in 1920? Why or why not?

Extension/Enrichment:

1. Introduce students to the Exodusters, African Americans who moved from the South to the American West in the 1870s and 1880s. Encourage students to research these pioneers, identifying the pushes and pulls that sent them from the South to the West. How were their motivations similar to and different from the motivations of the migrants studied in this lesson? A good reference for middle school students particularly would be *Going Home to Nicodemus: The Story of an African-American Frontier Town and the Pioneers Who Settled It*, by David Chu and Bill Shaw (Morristown, NJ: Julian Messner/Silver Burdett Press, 1994).

2. Have students research some of the routes African Americans took to the North. What modes of transportation were most common? How did this affect settlement patterns in the North?

3. The website of the U.S. Census Bureau (http://www.census.gov) provides considerable information about migration within the United States. Challenge students to analyze this data and create a display about where and why people are migrating to and from within the United States.

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DISCUSSION QUESTIONS FOR *THE GREAT MIGRATION*

1. What was the Great Migration? Was the Great Migration caused by pushes, pulls, or both?
2. Use Lawrence's images and words to develop your own description of what it was like to be part of the Great Migration.
3. What were the hopes of African Americans who migrated from South to North? Do you think those dreams were realized? Give evidence to support your answer.
4. How did the Great Migration affect the South? What did people in the South do about these effects?
5. How did the Great Migration affect the North? What did people in the North do about these effects?
6. Why did Lawrence keep repeating the phrase "and the migrants keep coming"? How does the repetition of this phrase affect you?
7. What was your initial reaction to Lawrence's paintings? Did your response change as you studied the paintings? If so, how?
8. What did you like best about Lawrence's paintings? What, if anything, did you not like?
9. Describe how Lawrence did the painting. What was unusual about his method? Do you think it was effective? Why or why not?
10. Imagine that you were an African American living in the South in 1918. Do you think you would have moved North? Why or why not?

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AFRICAN AMERICANS MOVE NORTH

During World War I, 367,000 African American soldiers served in the armed forces. On the home front, it is estimated that black Americans bought $250,000,000 worth of war bonds and stamps. Millions of African Americans also worked in war industries.

The jobs available in war industries were a major factor in prompting black migration from the South to the North. Labor conditions in the South were poor, with boll weevil infestations and floods having destroyed large portions of the cotton crops in 1915 and 1916. Meanwhile, foreign immigration had slowed drastically, leaving northern industries with a labor shortage. Soon, blacks were pouring North to find work, encouraged by black newspapers, which stressed not only economic but social reasons. The *Chicago Defender* wrote, "To die from the bite of frost is far more glorious than at the hands of a mob." The *Defender* received thousands of letters like the one below, written in 1917:

> Dear Sir: I have learned of the splendid work which you are doing in placing colored men in touch with industrial opportunities. I therefore write you to ask if you have an opening anywhere for me. I am a college graduate and understand Bookkeeping. But I am not above doing hard labor in a foundry or other industrial establishment. Please let me know if you can place me.

After the war, black soldiers returned home, hoping to get, as historian John Hope Franklin described it, "a larger share of democracy for themselves," but there were "many white citizens who were as determined to see that there should be no wholesale distribution of the blessings of liberty." The Ku Klux Klan grew in strength, blacks were lynched in the South, and there were race riots across the country. Between June and December 1919, for example, there were 25 race riots, including a bloody 13-day riot in Chicago.

Although conditions in the North were far from perfect, many blacks continued to leave the South. W.E.B. DuBois, writing in 1920, urged continued migration:

> There are, to be sure, Voices in the South—wise Voices and troubled Consciences; souls that see the utter futility and impossibility of the southern program of race relations in work and travel, and human intercourse.
>
> On the other hand, we win through the ballot. We can vote in the North. We can hold office in the North. As workers in the northern establishments we are getting good wages, decent treatment, healthful homes and schools for our children. Can we hesitate? COME NORTH! Not in a rush—not as aimless wanderers, but after quiet investigation and careful location. The demand for Negro labor is endless. Immigration is soon cut off and a despicable and indefensible drive against all foreigners is shutting the gates of opportunity to the outcasts and victims of Europe. Very good. We will make America pay for her injustice to us and to the poor foreigner by pouring into the open doors of mine and factory in increasing numbers.

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13. Women at Work

Overview:

Although women are an important part of the world's labor force, much of their work is not assigned an economic value. Since many of the tasks women perform in the home are not directly compensated, much of this work is considered "invisible." In this lesson, students investigate various types of work and the influence of place and culture in shaping women's work experiences.

Objectives: At the end of this lesson, students will be able to:

1. Classify types of work and distinguish between visible and invisible work.

2. Identify the home as one of many places that function as a center of economic activity.

3. Interpret data gathered from oral interviews and create clock graphs from the data.

4. Compare and contrast a typical work day in the United States with a typical work day in a developing country.

5. Compare and contrast the significance of the rural v. urban work experience.

Standards Addressed: 4, 10, 11

Themes Addressed: Place, Relationships within Places, Regions

Time Required: 2 class periods

Materials and Preparation: You will need copies of Handouts 13-1, 13-2, and 13-3 for all students. You will also need to be familiar with the information in the **Teacher Background Information** so that you can share it with students in a mini-lecture and to be prepared to read the **Guided Imagery Text**, "Day in the Life of Two Women in Rural and Urban Kenya," aloud to students. A wall map of the world will be useful to identify the relative locations of the United States and Kenya.

Procedure:

1. Ask students: What comes to mind when you think of the word *work*? Direct them to list on a piece of paper at least 10 activities they would call work. Allow two to three minutes for students to generate their lists.

2. Have students turn to another person near them and share their lists. Have them circle those activities named in common.

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3. As a large group, compose a class list of work activities on the blackboard.

4. Distribute Handout 13-1. Tell students to take notes on the types of work described as they listen to a teacher explanation; these notes will be important over the course of the next two days. Your mini-lecture should be prepared by using the **Teacher Background Information**, which provides a simple definition of different types of work and concrete examples of each. Encourage students to participate by naming more examples for each type of work discussed.

5. Direct students to look at the list of activities already generated on the board, and have students categorize those activities based on the types of work about which they just learned.

6. Encourage discussion using the following question strategy:

- Which category of work had the most examples listed on the board?
- Why do you think that category had the most examples?
- Are more men or women involved in productive work? Why do you think so?
- Are there any categories of work that are not represented on the board? What?

7. At the beginning of the next class period, read the **Guided Imagery Text**, "A Day in the Life of Two Women in Rural and Urban Kenya." For a guided imagery exercise to be effective, external stimuli need to be minimized so that students can focus on your voice and what you are reading to them. To facilitate this, try to make the classroom as non-stimulating as possible by dimming the lights, closing the door(s), and having students put all materials away.

Guided Imagery Text: A Day in the Life of Two Women in Rural and Urban Kenya

Today we are going to imagine what it might be like to be a woman in Kenya. Please close your eyes, relax in your chairs, and listen carefully to what I'm going to say. I would like for you to try to imagine and picture in your mind what I'm about to describe.

The day of a woman in rural Kenya begins at 4:45 a.m. She has 15 minutes to wash up with yesterday's leftover water and get dressed. From 5:00 to 5:30 a.m. she prepares breakfast for her family and eats with them. She then gets the children ready for school and is walking to the fields by 6:00. When she arrives at the fields by 6:30 a.m., she begins to work and continues until 11:00 a.m., when she takes a 15-minute lunch break. She continues to work until 3:00 p.m. As she makes her way home, she collects firewood and finally arrives at her home at 4:00 p.m. Pounding and grinding the corn for the evening meal takes one-and-a-half hours (until 5:30 p.m.). Collecting water is very important and it takes her from 5:30 to 6:30 p.m. to do that. When she gets back home, she cooks for the family and eats; it is now 8:30 p.m. She then washes the children, the dishes, and herself. At 9:30 p.m. she goes to bed.

For a Kenyan woman who lives in the city, the day begins at 5:00 a.m., when she washes and dresses herself. She prepares the family's breakfast and eats. She gets the children ready for school, working quickly since she has got to be on the bus by 6:15 a.m. After the 45-minute bus ride, she starts her work as an office manager at 7:00 a.m. With the exception of a half hour lunch break, she works until 4:00 p.m. She catches the bus and is home by 4:45 p.m. She stops at the market to buy vegetables for dinner and is home shortly after 5:00 p.m. Then she prepares the family's dinner and sits down to eat with them. After dinner, she helps the children with their homework for a half hour. At 6:45 p.m. she begins to do the family's sewing and laundry. At 7:30 p.m. she washes the children, the dinner dishes, and herself. At 8:30 p.m. she puts the children to bed and does some dusting and mops the floor. She watches her favorite TV show from 9:00 until 9:30 p.m. and goes to bed.

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8. Ask: How does the definition of work we talked about yesterday reflect the activities of both of these women?

9. Distribute Handout 13-2 and ask students to classify each activity in the schedules using the categories learned the previous day.

10. Distribute Handout 13-3 and explain to students how schedules can be represented in a clock format. Ask students to create a clock graph for the schedules of the two Kenyan women.

Option 1: Students can draw diagonal lines for those times during which the women are occupied in work, and draw dots during those times in which they engage in non-work activities.

Option 2: Students can assign a color to each of the five types of work discussed and complete the clock graph so that it depicts the different types of work in which the women engaged.

11. Encourage discussion by using the following questioning strategy:

- Which type of work takes up most of the day for the rural woman? For the urban woman?
- How are the schedules of the two women in Kenya different?
- How are their schedules similar?
- Are there such differences between rural and urban people in the United States?
- How are the lives of rural and urban people in the United States similar?
- How do you think the schedules of these two women would compare with the daily schedules of women in the United States?

Extension/Enrichment:

Have students interview one adult female and one adult male whom they know regarding their work life. Have them apply the interview data they collect into clock graph form. They may also synthesize their findings into a two-minute presentation.

Teacher Background Information:

The definition of work—how one uses one's time to accomplish something—can be organized under at least five categories: productive, reproductive, support networks, kin work, and status-enhancing work. Personal maintenance (sleeping, washing oneself, eating) and doing things you choose to do for leisure are not considered work.

1. Productive Work: This type of work is usually considered "real" or "visible" work because cash payment is received for the work that is done. Productive work has been traditionally associated with men. Examples of this type of work include building constructors, doctors, clerks, auto mechanics, and teachers. Increasingly, women are entering the paid work force.

2. Reproductive Work: This type of work includes domestic work and child care; it is usually associated with women. Domestic chores, including walking long distances each day to get fresh water and to gather firewood, constitute reproductive work—considered to be "invisible" because it is not paid. Other examples include chauffeuring children to school activities, preparing family meals, and doing laundry.

3. Support Networks: This type of work is done to help other people and is usually associated with women. Often, it is done on behalf of the entire family. It is considered "invisible" work because

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it is done in the private arena of home and family, and the time and effort invested in it are not easily measured nor compensated. For example, loyal relationships are built by offering support in difficult times to family and friends.

4. Kin Work: This is physical and mental work that maintains cross-household ties and quasi-kin or "fictive" (e.g., godparents) ties; for example, visits, letters, presents, telephone calls, cards to kin, the organization of holiday gatherings. Because it is unpaid and often unrecognized work, it is considered "invisible." This work sometimes overlaps with Support Networks.

5. Status-Enhancing Work: These are tasks that improve or impress on others the position of one's self or family. Even though this type of work can be associated with both men and women, it tends to be done primarily by women. Many times this work is looked upon as leisure activities engaged in by the wealthy. Volunteer work may be looked upon this way. For example, a woman who organizes a fund-raising activity for a hospital can enhance her husband's status. This service lets the public know that her husband has the kind of income that allows her not to engage in "productive work" and she has time to volunteer. Although this work is necessarily visible by members in the family and community, it is unpaid and not usually considered "real" work.

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TYPES OF WORK NOTES GUIDE

Definition of Work:

Productive Work	**Reproductive Work**	**Support Networks**	**Kin Work**	**Status-Enhancing Work**
Definition:	Definition:	Definition:	Definition:	Definition:
Examples:	Examples:	Examples:	Examples:	Examples:

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SCHEDULES OF TWO WOMEN IN KENYA

A Day in the Life of a Woman in Rural Kenya

4:45 a.m.-5:00 a.m.	Get up, wash (with yesterday's water)
5:00 a.m.-5:30 a.m.	Prepare breakfast for family, eat
5:30 a.m.-6:00 a.m.	Get children ready for school
6:00 a.m.-6:30 a.m.	Walk to fields
6:30 a.m.-11:00 a.m.	Work in fields
11:00 a.m.-11:15 a.m.	Lunch break
11:15 a.m.-3:00 p.m.	Work in fields
3:00 p.m.-4:00 p.m.	Collect firewood and return home
4:00 p.m.-5:30 p.m.	Pound and grind corn
5:30 p.m.-6:30 p.m.	Collect water
6:30 p.m.-8:30 p.m.	Cook for family, eat
8:30 p.m.-9:30 p.m.	Wash children, dishes, and herself
9:30 p.m.	Go to bed

A Day in the Life of a Woman in Urban Kenya

5:00 a.m.-5:15 a.m.	Get up, wash
5:15 a.m.-5:45 a.m.	Prepare breakfast for family, eat
5:45 a.m.-6:15 a.m.	Get children ready for school
6:15 a.m.-7:00 a.m.	Take bus to work
7:00 a.m.-11:30 a.m.	Work as an office manager
11:30 a.m.-12 Noon	Lunch break
12 Noon-4:00 p.m.	Work as an office manager
4:00 p.m.-4:45 p.m.	Take bus back home
4:40 p.m.-5:00 p.m.	Stop at market, buy vegetables for dinner
5:00 p.m.-6:15 p.m.	Prepare dinner for family, eat
6:15 p.m.-6:45 p.m.	Help children with homework
6:45 p.m.-7:30 p.m.	Do the family laundry, sewing
7:30 p.m.-8:30 p.m.	Wash children, dishes, and herself
8:30 p.m.-9:00 p.m.	Put children to bed, do light housework
9:00 p.m.-9:30 p.m.	Watch television
9:30 p.m.	Go to bed

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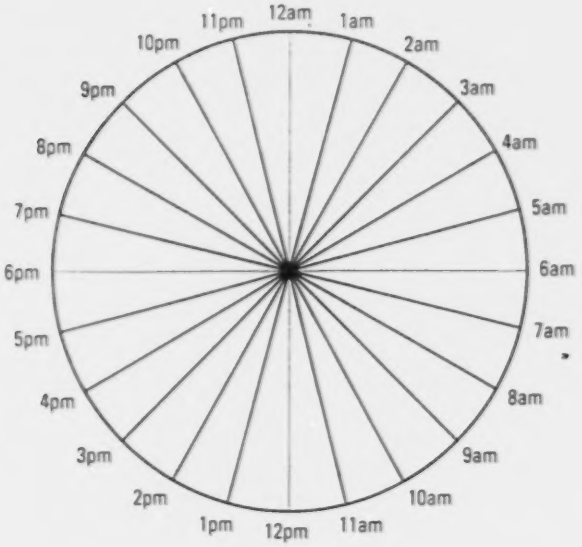
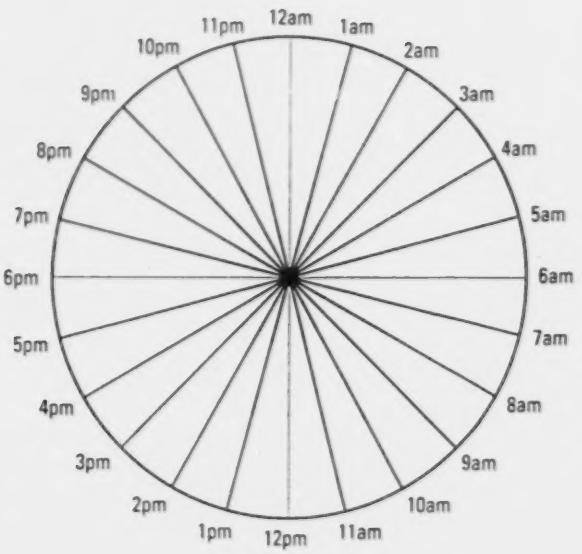
Clock Graphs of Two Kenyan Women

Rural Kenyan Woman



Urban Kenyan Woman



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14. The Tobacco Habit: Marketing and Morality

Overview:

Tobacco is in the news! With the Clinton administration's categorization of tobacco as an addictive drug, wrongful death suits against tobacco companies pending in several U.S. states, new government initiatives to limit advertising, and revelation of tobacco company documents detailing early knowledge of tobacco's addictive qualities, there has been a swirl of controversy about the tobacco habit, individual rights, and free speech. This lesson brings into focus some of the salient issues in this controversy by providing students with some facts and statistics relating to the "Tobacco War."

Objectives: At the end of this lesson, students will be able to:

1. Understand some of the economic and political forces at work in the tobacco industry.

2. Recognize some of the health implications of Asia's smoking problem.

3. Exercise analytic skills in regard to profit motive, advertising, and social pressures related to tobacco consumption.

4. Gain understanding of the concept of multinational companies.

5. Extract factual information from graphs and charts.

Standards Addresses: 4, 6, 10, 11

Themes Addressed: Movement, Place

Time Required: 2-5 class periods

Materials and Preparation: You will need copies of Handouts 14-1 through 14-4 for all students. You will also need slips of paper with the following roles written on them: U.S. tobacco company executive, U.S. congressperson opposed to smoking, U.S. congressperson or senator from a tobacco-growing state, member of an anti-smoking citizen's group in the United States, member of China's National Health Service, cigarette company executive from China, physician from China, representative from the U.S. Center for Disease Control and Prevention, citizen from an anti-smoking group in China, government official in China with cigarette interests in his province. At one stage in the lesson, students are asked to read three articles about smoking in Asia. You may want to work with the school librarian to create a vertical file of recent articles on the topic; other excellent sources to

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Developed by Patience Berkman, Newton Country Day School, Newton, Massachusetts.

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which students can be referred are the "SIRS Researcher" CD-ROM and several of the SIRS print notebook collections of articles. Three excellent articles (reproducing these articles here was cost-prohibitive) that could be placed on reserve are:

"For Helms, His Home State Is Source of Foreign Policy," by David E. Sanger, *New York Times* (April 2, 1996), pp. A1, A18.

"In Heavy Smoking, Grim Portent for China," by Patrick E. Tyler, *New York Times* (March 16, 1996), pp. 1, 5.

"Stealth Marketing: Cigarette Makers Are Already Dodging New Restrictions on Advertising," by Leslie Kaufman with Jolie Soloman and Steve Rhodes, *Newsweek* (March 3, 1997), pp. 56-57.

Procedure:

1. For background some days before you start this lesson, have students research the tobacco-growing regions of the world, entering their findings on a blank world map (one is provided on Handout 14-1). Have students note the source of their information and keep this map for reference during the following activities.

2. On the first day of the lesson, begin by discussing students' maps of tobacco-growing regions and their sources. Read Handout 14-2 aloud together. There is provocative information in the handout, so this should be a really interesting exercise. Have students locate places mentioned in the handout on a wall map in the classroom and on their world maps.

3. Before you begin discussing the handout in depth, be sure students have a clear idea of the meaning of *"multinational company"* since this is a key concept. As you proceed, have students give two examples from the article. Use the following questions to stimulate discussion:

- How have tobacco companies been able to get around governmental bans on cigarette advertising on TV and radio?
- Why is China the most desirable target of the multinational tobacco companies?
- What concessions have been made to American trade negotiators by foreign governments?

4. After finishing the article, raise the question: What moral issues are involved in "The Tobacco War"? List student resources on the board.

5. Assign students to find and read three articles as homework. Three excellent articles are listed in **Materials and Preparation**. You may want to suggest other sources as well. Students should take notes on the factual information in the articles; at the end of each set of notes, students should write a paragraph summarizing how the article adds to their understanding of tobacco use in Asia. Make it clear to students that they should read the articles carefully, for they will be using their notes the next day for a challenging activity.

6. At the beginning of the next class period, organize students into groups of three to five students. Pass out Handout 14-3 to all students, asking them to categorize the factual information from their notes and the articles into the categories shown on the handout. They should each record the information in columns for use in that night's homework assignment. Require them to note the source for each fact in the column to the left. They should share information and help each other build complete data sheets.

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7. Distribute Handout 14-4 and ask students to determine what the data from the charts adds to their understanding of the issues involved. Instruct them to enter this data under the appropriate category on their data sheet as well.

8. If you are short of time, you could call the large group together and wind up the lesson at this point with a discussion of the groups' findings.

9. If you have time for the following writing/roleplay exercise, ask each student to choose a role (the slips of paper you have prepared, drawn out of a hat).

10. Students should formulate written arguments in favor of or opposed to the export of U.S. tobacco products to China depending on their role. Stress that staying in character is of key importance. Students should select data from their charts to build convincing arguments. They should formulate a position paper with three sections:

- Introduction/Background
- Statement of the major problems, *from their character's perspective*
- Proposed course of action or solution with supporting reasons

11. The following day, have students share their position papers in one large group or in smaller groups. Discuss similarities, differences, and use of the data for different purposes. The papers can be used to assess students' understanding of the issues.

Extension/Enrichment:

1. Have students work as individuals or in groups to collect as many cigarette ads as possible over a period of time. Have them categorize the ads and determine the images, hidden messages, goals, and target groups of the various ads. Each group could present its findings to the larger group or could select some ads to include on a poster or collage with a message. "Wake-Up Call," "Advertising Alert," or "A Closer Look" are possible titles. Students could search for ads that target specific groups such as young people or women for a similar poster project, and research statistics on smoking in such groups. One useful resource would be information on "Teenage Smoking Rates Around the World," found in *Issues and Controversies on File*, published by Facts on File, September 13, 1996, p. 552.

2. Have students watch for the use of cigarettes in feature films. Who smokes? How much? What is their role in the film? How prevalent is smoking in the film? How is the act of smoking portrayed in the film?

3. Students could research smoking habits in Eastern Europe and the former Soviet Union and the efforts of U.S. tobacco companies to build these markets. *Ashes to Ashes* would be a helpful resource. Part of the project could be to enter their data on a map in a creative way.

4. Students could research what their local community is doing to deal with the tobacco habit. Are there smoke-free areas in public places? In restaurants? Has their town government shown concern about the habit among young people and taken steps to address the problem? Students could design interviews to gather public opinion about some of these topics.

Resources:

Glantz, Stanton A., *Tobacco, Biology and Politics* (Waco, TX: HEALTH EDCO, A Division of WRS Group, Inc., 1992). An excellent 48-page pamphlet with short, readable, well-researched factual

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information on how cigarettes addict, reproductive effects, effects on nonsmokers, the tobacco industry, television advertising.

Kluger, Richard, *Ashes to Ashes: America's Hundred Year Cigarette War, The Public Health and the Unabashed Triumph of Philip Morris* (New York: Alfred A. Knopf, 1996). Comprehensive and meticulously detailed overview of the struggle. Chapter 19, "Smooth Characters," pages 708-722, details the exploration and exploitation of foreign markets for tobacco products.

Mackay, Judith, *The State of Health Atlas: A Concise Survey of World Health Through Full-Color International Maps* (New York: Simon and Schuster, A Touchstone Book, 1993). Map 15, "The Superfix," Details statistics on the proportion of men and women who smoke manufactured cigarettes daily and projects future worldwide annual deaths from tobacco, comparing rich and poor countries.

"No Smoking: A Traveler's Status Report," *New York Times* TRAVEL Section (Sunday, June 30, 1996). Restrictions and smoking habits are described for Europe, Asia, South America, Canada, Mexico.

SIRS Researcher (Boca Raton, FL: SIRS, n.d.). This CD-ROM is a terrific research tool for several of the enrichment activities.

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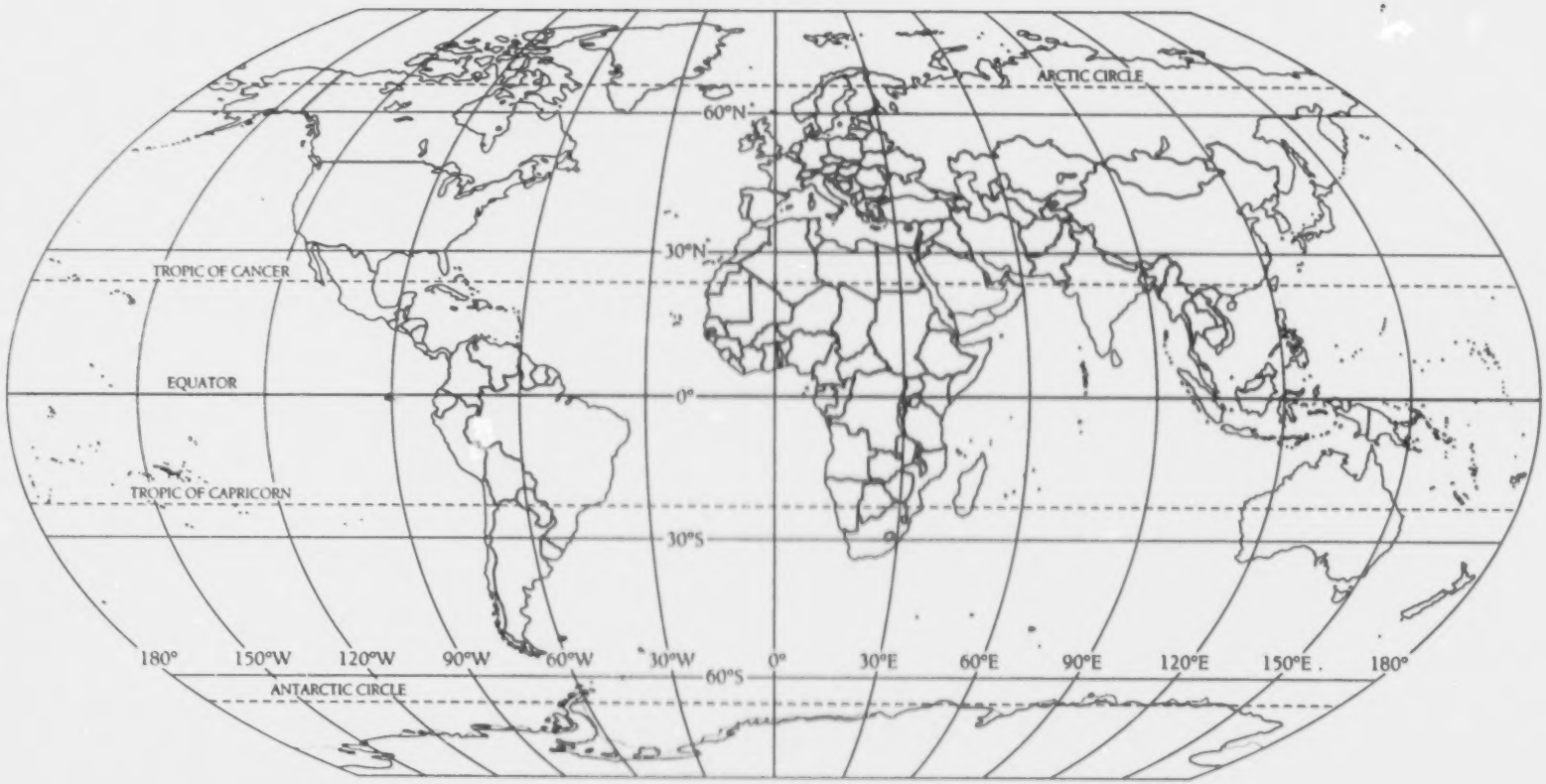
WORLD MAP



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BEST COPY AVAILABLE

ASIA GOING UP IN SMOKE

Laws banning smoking in public places. Tougher restrictions on advertising—especially advertising aimed at children. Lawsuits asking millions of dollars in damages. Leaks of documents showing that tobacco companies knew of smoking's harmful effects while denying those effects publicly. These are just some of the problems facing tobacco companies in the United States in recent years.

Are the giant multinational tobacco companies in financial danger? Probably not, because cigarette use is growing in Asia, Africa, Latin America, Eastern Europe, and in the former Soviet Union. In Asia alone, the World Health Organization estimated at the beginning of the 1990s that smoking would increase by one-third during the decade.

The Asian Market

In many Asian countries, smoking is fashionable. And Asian smokers seem to be susceptible to glitzy advertising campaigns. Smoking American or European cigarettes is seen as "cool." According to a *New York Times* article (Shenon 1994), "No gift is more appreciated in Vietnam than British-make '555' cigarettes. In China, the choice is Marlboro. Among the gentry of Thailand, it is Dunhill." Rates of smoking are extremely high among Asian men—60 percent in Japan and China, for example, and a whopping 73 percent in Vietnam (Pollack 1997).

While some Asian governments have followed the lead of Western nations and banned tobacco advertising on television and radio, the tobacco companies find ways to get their message to the people—at sporting events, for example, or through clothing that sports cigarette logos. In Japan, the tobacco industry—the Japanese company which has a monopoly in local production of cigarettes and four multinational tobacco companies—has voluntarily developed new, tough advertising standards effective April 1, 1998. These standards are designed to control smoking by young people ("Trends in Japan" 1998). In strict Singapore, anti-smoking laws, such as laws against selling cigarettes to minors, carry heavy penalties. Such laws indicate that anti-smoking attitudes of Western countries are finding their way to some Asian countries.

China is an especially attractive market to the multinationals because it has a huge population (1.2 billion people) and a growing economy. The number of smokers in China is greater than the population of the United States (Shenon 1994). Other market groups targeted by the tobacco companies are Asian women and young people. While adult males have been the most common smokers in Asia, advertising aimed particularly at women and young people seeks to change that. Increasing numbers of Asian women see smoking as a sign of their liberation (Pollack 1997). In Vietnam, the number has reached as high as 34 percent of women, although 10 percent or less are more common figures across Asia.

The multinational tobacco companies say that they are not trying to get nonsmokers in Asia to start smoking. Instead, they say, they are trying to get Asian people who already smoke to change brands. The evidence suggests otherwise, however. In Hong King, very few

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women smoke. Thus, if companies are not interested in creating new smokers, Hong Kong would not appear to be a good market for a cigarette brand aimed at women. Yet Philip Morris introduced their Virginia Slims brand aimed specifically at women in Hong Kong a few years ago (Shenon 1994).

Under the Bush Administration particularly, the U.S. government pushed for agreements that allow free trade in cigarettes, thus ensuring that Asian countries would be open markets for American-based tobacco companies. The 1993 annual report of R.J. Reynolds Tobacco claimed that "Today, Reynolds has access to 90 percent of the world's markets; a decade ago, only 40 percent." Clearly, trade negotiators' efforts to support the American tobacco industry have been successful.

Health Effects

Physicians and scientists are concerned about how increased smoking will affect the health of the Asian people. One scientist estimates that "because of increasing tobacco consumption in Asia, the annual worldwide death toll from tobacco-related illnesses will more than triple over the next two or three decades, from about 3 million a year to 10 million a year, a fifth of them in China. His calculations suggest that 50 million Chinese children alive today will eventually die from diseases linked to cigarette smoking" (Shenon 1994).

The Japanese Ministry of Health included in its White Paper for 1997 a section linking smoking and lung cancer; it also discussed the dangers of passive smoke. This marked the first time a section on smoking appeared in the Ministry's annual report ("Trends in Japan" 1998). In previous years, the Ministry had tried to include such a section but had been overruled by the more powerful Ministry of Finance, which represents the interests of the tobacco industry (note that the Japanese government owns a major share of Japan Tobacco) (Pollack 1997).

References

Pollack, Andrew, "Overseas, Smoking Is One of Life's Small Pleasures," *New York Times* (August 17, 1997).

Shenon, Philip, "Asia's Having One Huge Nicotine Fit," *New York Times* (May 15, 1994), pp. 1, 16-17).

"Trends in Japan: Cigarette Ads," *Japan Now* (January 1998), p. 6.

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DATA SHEET

Source	Political Issues	Economic Issues	Moral Issues

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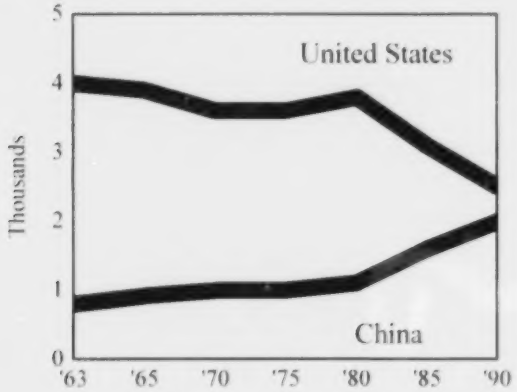
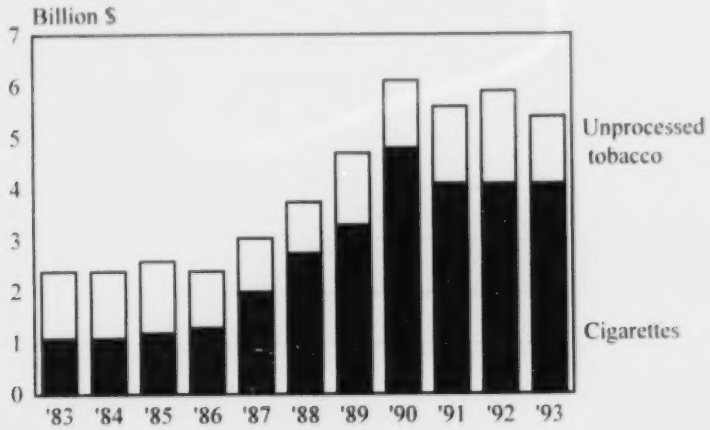
BY THE NUMBERS

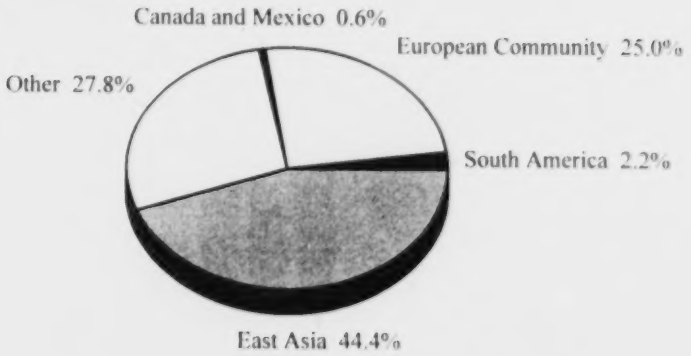
Cigarettes Smoked Per Adult in China and the United States



Exports of American Tobacco



Where Do American Cigarettes Go?



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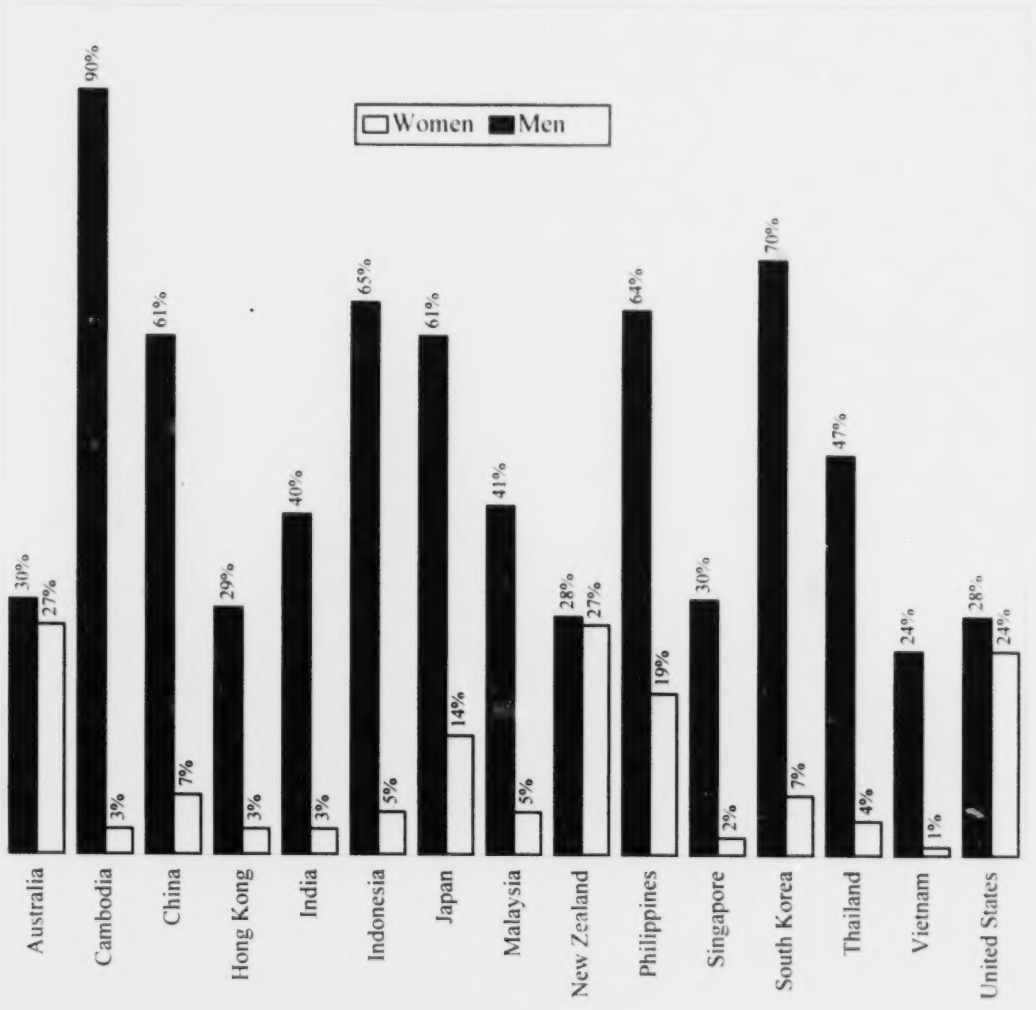
Comparing Countries: Percentage of Adults Who Smoke



Percentage of each country's adult population that smokes. Most figures are World Health Organization provisional estimates for 1994. The figure for Cambodia is its government's estimate, the Hong Kong figure is from a government survey in 1990, and the United States figure is for 1991 and is from the Centers for Disease Control.

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15. Communities of the Future

Overview:

History and geography books are filled with images of communities as the most important of social systems. By definition, communities are places where people depend on each other and organize their lives around common goals, needs, and interests. What concept of city will dominate our future? Will people view the community primarily as an economic and political unit, or will they feel a strong sense of belonging within some sort of geographic unit?

The traditional meaning of *a sense of community* is changing. Increasing numbers of people live in large metropolitan areas, move frequently, are geographically separated from their families, and spend their leisure time away from home and community. They take special classes, work at extra jobs, or pursue hobbies or sports in which they have invested a great deal of money. They may rarely discuss their work with family or friends because it is very routine or requires a great deal of technical knowledge.

How will such trends change the way people perceive and define community? Will communities be defined less by "a sense of place" and more by "common interests"? These are the questions students address in this lesson.

Objectives: At the end of this lesson, students will be able to:

1. Define *community* by analyzing a map illustrating participation in the community.

2. Develop a personal definition of *community* and compare it with the definitions of others.

3. Speculate about the importance of shared interests, rather than geography, as a force in determining the shape and organization of communities of the future.

Standards Addressed: 1, 6, 12

Theme Addressed: Place

Time Required: 1-2 class periods plus homework

Materials and Preparation: You will need poster paper, markers, and tape. A wall map of your community would be useful.

Adapted from *Teaching About the Future*, by John D. Haas and others (Boulder, CO: Social Science Education Consortium and Denver, CO: Center for Teaching International Relations, 1987).

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Procedure:

1. Ask each student to make a pictorial map or collage representing his/her community. Direct them to include home, school, places where they spend leisure time, places where they earn money, places where their parents work, shopping sites, homes of good friends and close relatives, special places they like to visit, etc. Encourage creativity in images, graphics, and designs. It would be helpful to provide a wall map of the community to help students with scale and direction.

2. Next, students should analyze their maps and write statements about their community, describing its location, size, shape, appearance, the opportunities it presents, and special functions (capital city, for example), if any. What do they like and dislike about their community?

3. To illustrate that people find community in different places and define *community* in different ways, ask students to compare their maps with their classmates'. This can be done in small groups or by posting the maps around the room and asking students to study the maps and make lists of the similarities and differences. As part of the large group discussion, ask students what geographic boundaries can be agreed upon. Do the boundaries of their map conform to those of the city? The metro area? What boundaries do they transcend in defining *community*? To what extent can students say they feel a sense of place? To make the concept of community more concrete, develop a composite map in which the class weighs (+1, +2, etc.) The importance of specific places in establishing the identify of their community. What is important, and what is missing that is traditionally considered important to the community?

4. Continue the discussion by asking students to what extent they have defined community based on interests and experiences they share with others? What geographic boundaries can the class agree upon? Would they say they live in the same or different community than their classmates?

5. Explore what students think communities will be like in the future. Are their ideas about communities of the future based on a sense of place or on common interests? What are the advantages and disadvantages of each concept for defining communities of the future? Ask students to prepare written responses to these questions as a homework assignment.

Extension/Enrichment

1. Working in groups, ask students to design a city of the future, incorporating facets that students believe are important to the city. Students should also choose a location for their dream cities, justifying the location based on geographic factors.

2. Assign students to research the growth of "megacities" in Asia. How many Asian cities are estimated to be larger than 10 million in population by the year 2025. How will this growth in urban population influence the lifestyles of the Chinese people? Can people in cities that large have any sense of community? If so, how can such a sense of community be encouraged?

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16. The Cold War: A Case Study of Conflict

Overview:

Throughout history, rivalry, conflict, and distrust among great powers have been constants in global politics. Such powers have typically had reasons to fear the other's intentions, as well as to promote vital interests that compete with other great powers. All too often, the end result of this competition, rivalry, and suspicion has been war.

The Cold War was unique in the history of the world for several reasons. First, it fueled an arms race, including nuclear weapons, of unmatched proportions. Second, the world was divided politically, militarily, and, to an extent, economically, into two spheres of influence—the "socialist" East and "capitalist" West—thus making the Cold War an excellent illustration of Standard 13.

This lesson introduces the ideological differences, misperceptions, antagonistic rhetoric, and conflict between the East and West during the Cold War.

Objectives: At the end of this lesson, students will be able to:

1. Identify the main antagonists of the Cold War and the general time period of hostilities.
2. Compare perspectives on the Cold War.
3. Explain the division of earth's surface resulting from the Cold War.

Standard Addressed: 13

Theme Addressed: Regions

Time Required: 3 class periods

Materials and Preparation: Make copies of Handouts 16-1 through 16-5 for all students. You will also need a supply of red and blue markers, pens, or pencils.

Procedure:

1. Ask the students what they know about the Cold War. When was it? Why is it called a "cold" war? Who "fought" whom? Where was the "Cold War" fought?

Adapted from *Global Issues for the '90s*, by Heidi Hursh and Jonathan Fore (Denver, CO: Center for Teaching International Relations and Boulder, CO: Social Science Education Consortium, 1993).

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2. Distribute Handout 16-1 and ask students to read it carefully. Distribute a copy of Handout 16-2 to each student; have them identify the NATO member countries by shading them blue and the Warsaw Pact countries red (refer to Handout 16-1 for NATO and WTO member countries). You might consider modeling this on an overhead projector.

3. After students have completed the map, review the most important information and clear up any questions regarding the map, vocabulary, or content.

4. Have students answer the following questions from Handout 16-1 either as a homework assignment or as a class discussion:

- What country did the United States and the Soviet Union join together to fight against during World War II?
- When did the Soviet Union and the United States become superpowers?
- What are three examples of military competition between the Soviet Union and the United States during the Cold War?
- Give four examples of how Soviet and U.S. ideology differed.
- How did the economic system of the United States differ from the economic system of the Soviet Union?
- How did the Cold War result in a division of the earth's surface?

5. Divide the class into two groups, an East and a West. One group will be responsible for presenting the U.S. point of view (Handout 16-3), and the other group will be responsible for presenting the Soviet point of view (Handout 16-4). Have each group read the comments on their reading and then summarize the viewpoints, perceptions, and objectives of each superpower as they relate to the Cold War.

6. Have each group present their side of the Cold War for the whole class. Facilitate the presentation and discussion so that all sides of the issue are presented and understood.

7. Close the discussion with the following questions:

- How does the media mold perspectives?
- Do leaders' opinions seem to differ from those of the common people?
- What was the greatest area of conflict?
- Which of the three forms of competition (military, economic, political) are most reflected in the comments?
- What areas of possible compromise can you identify?

Extension/Enrichment:

Divide the class into groups of four to six. Distribute Handout 16-5 to all students. As they follow the timeline and timeline key, have each group answer the following questions:

- When did the Cold War begin? When did it unofficially end?
- Which nation developed atomic weapons first?
- When was Germany divided and how long was it divided?
- When was Korea divided into north and south? Is it united now?

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- Which was formed first, NATO or the Warsaw Pact? When was each formed?
- Why was each alliance formed?
- When was the first time a nation tried to break away from the Warsaw Pact? Which country? When was the second time? What country?
- Who launched the world's first satellite?
- Why would the United States send U-2 spy planes over the Soviet Union?
- What island did U.S.-sponsored mercenaries invade?
- Who were the two leaders of the United States and Soviet Union during the Cuban Missile Crisis? Why was it a "crisis"?
- What is meant by "detente"? How long did detente last?
- What programs, or reforms, did Mikhail Gorbachev start?
- What, in your opinion, was the tensest moment of the Cold War?

References:

Brown, J.F., *Eastern Europe and Communist Rule* (Durham, NC: Duke University Press, 1988).

Gaddis, John Lewis, *The United States and the Origins of the Cold War 1941-47* (New York: Columbia University Press, 1972).

George, Alexander L., *Managing U.S.-Soviet Rivalry: Problems of Crisis Prevention* (Boulder, CO: Westview Press, 1983).

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THE COLD WAR

At the end of World War II (1939-1945), the United States and the Soviet Union emerged as the world's most powerful nations, or *superpowers*. Each nation had an enormous amount of military capability, political strength and leadership, and economic potential. Relations between these two countries were never friendly, but they were *allies* against Nazi Germany during World War II. Immediately following World War II, rivalry and suspicion between the United States and the Soviet Union intensified. This political, economic, and military rivalry soon created an atmosphere of tension and crisis that became known as the *Cold War*.

The United States and the Soviet Union were rivals in almost everything during the Cold War. The following is a brief description of the military, political, and economic competition between the two superpowers.

Military Competition: At the end of World War II, the United States and the Soviet Union had the two biggest militaries in the world. With the defeat of Nazi Germany, a common enemy had been eliminated, but both nations' armed forces were maintained at a high level. In addition to conventional weaponry, the United States had the technology to produce and use atomic weapons at the end of World War II (which they used twice on Japan). The Soviet Union wanted atomic weapons as well, and they tested their first atomic bomb in 1948. Each nation developed new and more powerful nuclear and conventional weapons, and an arms race was started. Each nation assigned their best scientists and engineers to produce the best, most accurate, and powerful weapons. After World War II, U.S. President Harry Truman began a policy of "containment," which would last until the Cold War ended. The policy of "containment" meant that the United States would try to "contain" any attempts by the Soviet Union to expand its power around the globe.

In addition, the United States and the Soviet Union established military alliances with other nations. In April 1949, the United States formed the North Atlantic Treaty Organization (NATO), whose purpose was to defend against a possible Soviet invasion of Europe. In all, 15 nations would enter the NATO alliance—the United States, Canada, Italy, Portugal, Denmark, Norway, Iceland, Greece, Turkey, West Germany, Britain, France, Belgium, Luxembourg, and the Netherlands. Likewise, the Soviet Union, under their leader Josef Stalin (Stalin means "man of steel" in Russian), formed the Warsaw Pact military alliance in 1952 as a response to NATO. In all, seven nations would join the Warsaw Pact (named after the city where the agreement was signed): the Soviet Union, Poland, East Germany, Czechoslovakia, Hungary, Bulgaria, and Rumania. With the formation of these two organizations, the military competition between the two nations increased and Europe became divided into *spheres of influence;* the United States was dominant in Western Europe, and the Soviet Union was dominant in Eastern Europe. With the division of Europe into two large military alliances, British leader Winston Churchill remarked that an *Iron Curtain* has descended over Europe, dividing the continent and restricting movement between East and West. As both sides continued to develop new weapons, the military strategy of each nation centered around the defense of its territory and the territory of its allies.

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Political Competition: The fundamental basis for each nation's form of government is vastly different and in conflict with the other. The concepts and ideas behind a form of government or political system are called ideology. Both nations thought their form of government to be superior. The Soviet Union was the political leader of the "Soviet Bloc," while the United States was the leader of the "Free World." Below is a brief summary of the ideological differences between the United States and the Soviet Union:

Soviet Ideology

- Personal property should be limited in order to make the standard of living more equal among all members of society.
- Only one political party is necessary, however the members of this party should be elected by the people.
- The government should own most businesses.
- The government should provide a large number of social services.

U.S. Ideology

- Personal property is a fundamental right of any individual.
- Having more than one political party is necessary in order to insure that opposing viewpoints are heard.
- Most businesses should be owned by private citizens.
- The government should provide a small number of social services.

Economic Competition: The United States and the Soviet Union also competed economically during the Cold War. The two countries had different economic philosophies. The economy in the Soviet Union was heavily state-owned (or government) and was centrally planned by government economic planners. The economy in the United States is owned mostly by private corporations with minor government control. Prices of goods and services in centrally planned economies tend to be stable, whereas prices in free enterprise economies tend to change often.

The Soviet Union formed the council of Mutual Economic Assistance (CMEA). This organization closely linked the economies of Eastern Europe: Poland, Czechoslovakia, Hungary, East Germany, Rumania, Bulgaria, as well as Cuba and Mongolia.

A special accounting unit, the transferable Ruble, was established as a means to facilitate trade. This monetary unit was not honored by the United States, Western Europe, or other nations that demanded "hard" currency for payment.

The United States barely traded with CMEA member countries during the Cold War. The U.S. Congress imposed trading restrictions with CMEA member countries on many forms of high technology and all types of military equipment. The United States would not accept Soviet currency (rubles) as payment for goods and services, only U.S. dollars.

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Outline Map of Europe

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U.S. Perspectives on the Cold War

"In the years after World War II the Soviet Union has amassed a large, formidable military which poses on imminent threat to the security of Western European nations. Due to this threat, the NATO forces must remain on constant alert and prepare to repel a Soviet surprise attack. The Soviet arsenal of nuclear weapons, both tactical and strategical, poses yet another threat to the safety of the free world. The increased number of small conventional conflicts involving Communist forces in Korea, Cuba, and Vietnam shows the desire of the Soviets to spread the communist ideal throughout the world. Because of this desire we must maintain peace through strength and vigilance."

General Spencer Welton
Commander of the U.S. Ground Forces in
West Germany

"When looking at the state of the Soviet Union and its satellite countries one thing stands out. The grim repression of the democratic movements in Hungary and Czechoslovakia shows that the Soviets are merciless when dealing with political opposition. The disregard for the people of Eastern Bloc countries and intense military buildup shows that the Communist party is more intent on keeping power than on providing for the welfare of their citizens. The very structure of the Communist party is unstable in its nature and leads to uncertainty in the progression of power. Their support of Communist revolutions abroad demonstrates the willingness of the Soviets to spread Communism throughout the world. All of these combine to make the Soviet Union potentially dangerous to the freedom of democracies everywhere."

Senator Robert Wilson, Chairman, Senate
Foreign Relations Committee

"I read somewhere that Soviet women get treated as second class citizens, and that Soviet people in general are unfriendly."

Mrs. Margaret Roberts, Housewife,
Spokane, Washington

"I read in this book that if you speak out against the government in the Soviet Union you will go to Siberia and work in a forced labor camp. Also, the government controls the mass media like newspapers, radio and television. It is no wonder the U.S. can't trust them."

Mrs. Sarah McMurphy, Teacher,
Cleveland, Ohio

"The President should really get tough with the Soviets. We cannot allow them to base nuclear missiles so close to the U.S. Also, why are they building so many ICBMs?"

Mr. Anthony Castamara, Salesman,
Austin, Texas

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SOVIET PERSPECTIVES ON THE COLD WAR

"The imperialistic and aggressive tendencies of Western countries have forced the Soviet Union and its allies to keep a constant vigil. The enormous size and power of the Capitalist nations has driven an arms race of great proportions. The Soviet Union has been able to keep up and maintain a large defensive force in East Europe. A build-up in nuclear weapons has put the Union of Soviet Socialist Republics in a position to defend itself through strength and against the possible invasion of western military nations in order to secure an acceptable peace. The aggression of the Western nations has been seen in Korea, Vietnam and Cuba. Because of this, the Soviet Union must be prepared to defend Communist ideals both at home and abroad through strength in arms."

Field Marshall Vladimir Surkonov
Commander of Soviet Ground Forces in
East Germany

"The United States, in their pursuit of worldwide democracy, has shown to us their aggression against the political structure of our nation. In addition, they openly mount a propaganda and sometimes a military offensive every time an oppressed nation's people want to liberate their country from pro-U.S. dictatorships and join the socialist camp. Our system of government is very appealing to people who have been exploited and degraded by the so-called democracies in the West."

Valentin Girshkin, Engineer, Gorky,
Russia

"I read in the paper that American women are discriminated against and they are not paid as much as men for the same job. This is not the case in the Soviet Union; men and women get paid the same."

Galina Burtsin, Architect, Leningrad

"I saw a documentary on TV that showed the crime and drug problem in the U.S.A. to be very bad, and law enforcement could not stop it. In comparison, our crime and drug problem is minor."

Boris Norganovich, Taxi Driver, Minsk,
Belarus

"I read in a newspaper that the civil-rights problem in the U.S.A. is horrible. Blacks are discriminated against by whites, and the U.S. government does not even care. Our constitution would not allow that to happen."

Konstantin Uranov, University Student,
Moscow State University

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"On TV they showed the newest American missile to be based in Germany, the Pershing II. I bet you that each one is aimed at the USSR. This is a serious threat. Why does America want to threaten and challenge us?"

Anna Petroshkin, Teacher, Kiev, Ukraine

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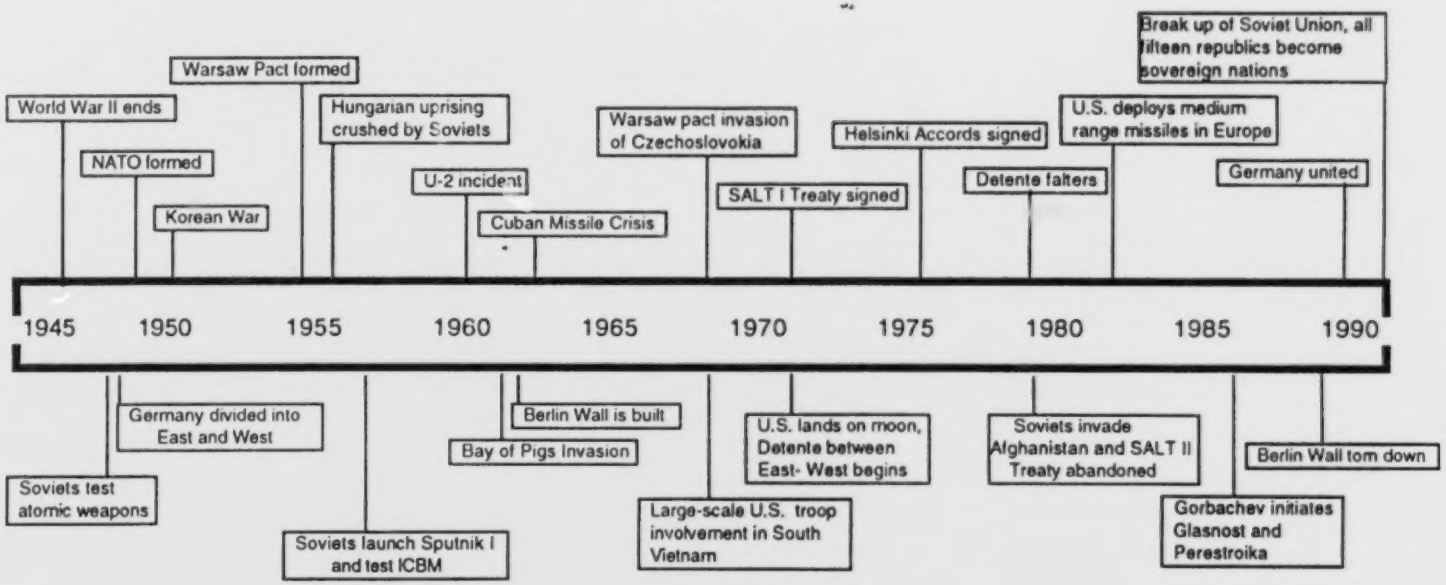
COLD WAR TIMELINE



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Cold War Timeline Key

World War II Ends: Berlin falls to Red Army troops and, within days, on May 8, 1945, Germany unconditionally surrenders to the Allies (comprised of Britain, United States, France, and the Soviet Union). The United States shifts its forces to the Pacific theater and on August 6, 1945, after two atomic bombs dropped by the United States and a Soviet invasion of occupied Manchuria, Japan also unconditionally surrenders. This officially ends the Second World War.

NATO Formed: In April 1949, Western nations form the North Atlantic Treaty Organization, a Mutual Defense Pact. The original members are: Norway, Denmark, Iceland, Netherlands, Belgium, Luxembourg, Britain, France, Spain, Italy, United States, and Canada. The agreement states "an armed attack against one or more of [its members] in Europe or America shall be considered an attack against them all."

Germany Divided Into East and West: In summer 1949, Western allies consolidate their occupation zones to form the Federal Republic of Germany, or West Germany. The Soviets control the German Democratic Republic, or East Germany.

Soviets Test Atomic Weapons: In the fall of 1949 the Soviet Union tests its first atomic bomb, alarming Western nations.

Korean War: Communist North Korea—with Chinese aid—invades South Korea. The U.N. condemns the action and sends United Nations forces, including many U.S. troops, to defend South Korea. After initial Communist victories, the U.N. troops win almost to the Chinese border. In July 1953, an armistice is signed, setting the border between North and South Korea at almost the prewar line.

Warsaw Pact Formed: In 1955, West Germany joins NATO, prompting the Soviet Union and its satellite countries to form the Warsaw Pact, a mutual defense alliance. The original members are: Soviet Union, Poland, East Germany, Czechoslovakia, Hungary, Rumania, and Bulgaria.

Hungarian Uprising Crushed by Soviets: In 1956, protests in Poland spur Hungarians to demonstrate for more freedom. Hungary attempts to break away from the Warsaw Pact and looks to the West for aid. Soviets and other Warsaw Pact nations descend on Budapest and crush the Hungarian prodemocracy "freedom fighters."

Soviets Launch Sputnik I and Test ICBM: In 1957, the Soviets successfully launch an Intercontinental Ballistic Missile and also launch Sputnik I, the first artificial earth satellite. In early 1958, the United States also puts a satellite into orbit and confirms both nations' capability to fire long-range heavy lift missiles with nuclear payloads.

U-2 Incident: In May 1960, a U.S. U-2 spy plane is shot down over Soviet Union. An apology is demanded by the Soviets and refused by the United States. A summit meeting is canceled as tensions flare.

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Bay of Pigs Invasion: In April 1961, anti-Castro Cuban exiles, sponsored by the United States and trained by the CIA, invade Cuba. This mission fails with extremely high casualty rate, and Castro strengthens his control over Cuba.

Berlin Wall Is Built: On August 13, 1961, a wall dividing Berlin into east and west is built by the Communists. U.S. tanks and troops enter the city and Soviets cancel defense cuts and increase military spending.

Cuban Missile Crisis: In October 1962, the United States learns the USSR has secretly put missiles into Cuba. U.S. President Kennedy demands that they be removed and puts a blockade on Cuba. Soviets agree to remove the missiles if the United States removes its missiles from Turkey. United States refuses, and tensions reach a climax. After a week, Soviet Premier Khrushchev agrees to remove the missiles.

Warsaw Pact Invasion of Czechoslovakia: In August 1968, Warsaw Pact forces led by the Soviets invade Czechoslovakia, squashing a Czech attempt to gain more freedom. Soviet troops remain in Czechoslovakia to assure its continuation as a Soviet satellite nation.

U.S. Reaches Large-Scale Troop Involvement in South Vietnam: By 1968, 500,000 U.S. troops are fighting in South Vietnam. The United States has been steadily increasing its involvement in the war in Vietnam, while the French, who have been fighting in Southeast Asia for over ten years by 1968, complete their withdrawal. The United States pulls out all of its troops in the country by 1973 after 50,000 U.S. troops are killed and 250,000 wounded. South Vietnam falls to the Communist forces in 1975.

SALT I Treaty Signed: U.S. President Nixon and Soviet Premier Brezhnev sign the Strategic Arms Limitation Treaty to limit production of nuclear weapons. Tensions relax.

U.S. Lands on Moon; Detente Between East-West Begins: In 1972, the United States lands astronauts on the moon. A detente, or relaxation of tensions, begins between the U.S. and the Soviet Union.

Helsinki Accords Signed: Tensions relax in 1975 as the Helsinki Accords are signed by the East and West. Both sides agree to the borders of post-World War II Europe and set certain human rights requirements for all the signing nations.

Soviets Invade Afghanistan and SALT II Treaty Abandoned: In 1979, the United States and USSR sign the SALT II Treaty limiting long-range nuclear weapons. In late 1979, the Soviets invade Afghanistan to support the fledgling Communist puppet government against the rebel Mujahadeen forces. United States stops consideration of the SALT II Treaty and supports the rebels in Afghanistan. The detente between the United States and USSR falters.

U.S. Deploys Medium Range Missiles in Europe: In June 1982, the United States and the Soviet Union open the Strategic Arms Reduction Talks (START). In 1983, after some progress, NATO deploys Pershing II medium-range nuclear missiles in western Europe and the Soviets walk out on the talks.

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Gorbachev Initiates Glasnost and Perestroika: In 1986, the new Soviet Premier, Mikhail Gorbachev, introduces the glasnost and perestroika programs. These programs encourage new ideas and trigger a democratic movement throughout the Soviet Union and Eastern Europe.

Berlin Wall Torn Down: In November 1989, the wall dividing East and West Berlin is bloodlessly torn down by thousands of protesters opposed to the East German government.

Germany United: In 1990, Germany is united under the Kohl government. The two Germanys, the United States, USSR, Britain, and France begin reunification negotiations. The Soviets agree that the untied Germany will join NATO and the economies are joined in July. Official political union occurs on October 3, 1990.

Breakup of Soviet Union, All Fifteen Republics Become Sovereign Nations: In August of 1991, a coup attempt by Communist party hardliners, including certain elements of the armed forces and the KGB, forces Gorbachev to resign and this accelerates the end of the Soviet Union. All former 15 republics elect national leaders and adopt their own constitutions.

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Active Teaching: Simulations

A simulation is a model of a real-world process. In a simulation, according to a classic book by Taylor and Walford (1972), three things happen:

- Players take on roles that are representative of the real world and then make decisions in response to their assessment of the setting in which they find themselves.
- They experience simulated consequences that relate to their decisions and their general performance.
- They "monitor" the results of their actions and are brought to reflect upon the relationship between their own decisions and the resultant consequences.

As an instructional strategy, the simulation offers many advantages. Simulations are fun, engaging, and motivate students to participate. They link classroom learning to the real world, a key to making learning meaningful. They also allow students to construct their understanding based on experience, a critical aspect of teaching according to current research on how students learn. They also provide students with an opportunity to practice and develop oral communication and interpersonal skills.

Of course, simulations have some disadvantages as well. They do require careful preparation and management by the teacher, as well as significant classroom time to complete. They may be noisier than traditional classroom activities. If not carefully debriefed to tie the experience to previous classroom learning, simulations may be regarded by parents and others as substanceless "games" and may not, in fact, meet the instructional goals for which they were intended.

Choosing a Simulation

In social studies classes, simulations are especially effective in recreating the process used in making decisions. Some types of simulations that are appropriate for geography classes are mock trials, mock legislative hearings, city council meetings, and international treaty negotiations. Business simulations are also appropriate.

A special form of simulation is the computer simulation. The computer can make simulations more realistic and effective by providing increased sophistication, access to databases, inclusion of random events, branching, and reinforcement.

A number of published simulations are available (see pages 140-141 for a list of selected simulations). In selecting a simulation for use (as in selecting any lesson), you should consider what your desired outcome or goal is and look for a simulation that closely matches that goal or outcome. Because of the time and effort required to implement a simulation, the goal or outcome being addressed should be an important one. Some simulations require extensive teacher preparation. Teachers must ask themselves: "Is it worth it?"

If a published simulation that matches your outcomes is not available, you can also develop your own simulation. This, too, requires considerable time and effort and should be subjected to the "Is it worth it?" test.

Developed by Laurel R. Singleton, Social Science Education Consortium.

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To develop a simulation, you must first choose the real-world process or situation you want to simulate, one that is linked to your instructional purposes. For example, you decide to develop a simulation that will address standard 14 (how humans actions modify the environment) and standard 18 (how to apply geography to interpret the present and plan for the future). Because your own community is facing a decision about what to do with a plot of land deeded to the city by former residents, you decide to simulate a city council meeting at which different plans for the land are presented and the city council reaches a decision.

When you have established this context for the simulation, you must identify the components and describe them for students. This identification involves providing roles, identifying the exact problem to be addressed and resources available to the "players," outlining the decision-making process, and developing basic rules for the simulation. In the example given above, you might create roles for several people with different plans for the land, as well as roles for the members of the city council that outline individuals' general approaches to issues of development, land use, and so on. You would also need to describe for students the community they represent and the resources it has available for using the land and develop a process for conducting the simulated meeting.

Even if your design is a good one, the simulation may not work as you had planned the first time (or even the second or third time) you try it. Each time you use the simulation, you should consider how well it addressed your purposes (based on your own observations and those of your students) and make revisions based on the strengths and weaknesses you identify.

Implementing a Simulation

Note that simulations usually involve role playing and small-group work. If students do not have experience with these techniques, teachers would be wise to do some role plays and small-group exercises before attempting a simulation. Some tips on role playing are provided in the box on page 139.

According to Gallagher (1979), simulations run more smoothly if the following stages are used:

Preparation: Break the simulation down by outlining the steps and allocating time periods for each. Be aware that a simulation may take longer than you expect (or, if it is a published simulation, longer than its developer predicted). Organize the classroom to suit the simulation, including rearranging furniture if necessary. The first time you use a simulation, you may want to arrange for a colleague or parent to observe the activity and provide you with feedback on how it could be improved.

Playing: Introduce the simulation briefly by outlining the rules and/or procedures. All students should have some assignment in every part of the simulation. For example, in a mock trial, all students may assist in the preparation of the cases, but there may not be enough active roles in the trial for everyone. Those students not participating should be asked to observe for specific criteria or to act as reporters, observing and writing stories or preparing newscasts following the trial. While the simulation is going on, be available to answer questions, intervene to handle problems (escalating noise), and provide direct instruction when appropriate (at the end of a "round" of activity, for example), but avoid intervening unnecessarily. Do pay close attention to what is happening in the simulation, as your observations will help you frame good questions in the debriefing discussion.

Debriefing: This usually consists of a follow-up discussion or other technique that helps students absorb and analyze what has happened. It is the most important stage of the simulation. First, the room should be rearranged in its usual setting. Second, a short one-page worksheet with questions designed to elicit reactions about the simulation will help to focus the discussion. It also helps to calm everyone down after what can sometimes be a chaotic and noisy experience. Then conduct small- and large-group discussion, using questions that isolate the purposes of the simulation. Be sure to relate the simulation to students' previous learning.

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Role Playing

Role playing is an element of virtually every simulation. It can also be an effective technique for helping students explore other points of view. Successful role playing depends on the establishment of a genuinely receptive atmosphere, based upon the teacher's belief that all individuals have the capacity to solve their problems. To maintain this atmosphere, students should be permitted to make mistakes and learn from them.

The peer group can also affect the success of role playing. Too often, young people are stereotyped by their classmates in a way that tends to be self-fulfilling or stifling in a role-playing situation. Students should not be assigned roles that have characteristics similar to their stereotypic classroom images.

Don't be discouraged if role playing appears to fail the first few times your students try it. Everyone tends to be uncomfortable with a new strategy, and role playing is one of the more demanding ones. Students will likely demonstrate this discomfort either by acting silly or by being unwilling to participate. They need a lot of support and encouragement in the beginning. Initial role-playing activities should be simple, but they should become increasingly more complex if role playing is to be more than an exercise in dramatics.

Below are some guidelines to follow in using a role play.

- Present the problem/situation. Give students adequate information to play their roles convincingly. Specify how much elaboration of the roles is expected/acceptable.
- Assign roles. An entire class may participate even if there are only two roles. Arrange the students in pairs or use trios, with the third student acting as observer.
- Get the class involved as quickly as possible.
- Vary role-playing activities. Students will tire of the same routine.

Discussion of the role play should either be integrated with the activity or follow it immediately. Any significant lapse of time between role playing and the debriefing will dilute the value of the activity. The following questions may be useful:

- Were the plays realistic?
- Was the problem solved? If so, how? If not, why not?
- Is this situation similar to anything you have personally experienced?
- How did you feel playing the role?
- If you repeated the role play, would you do anything differently?

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Two cautions are in order in the debriefing phase. First, competition is involved in some simulations. Teachers should be sure that students understand the purpose of the simulation and that "losing" the simulation does not mean students learned less or were less successful. Second, students may view simulations as unrealistic, and some of them are. Teachers should try to relate the concepts and principles of the simulation to real-life experiences.

Assessing Simulations

Directly assessing students' participation in a simulation is difficult and, many teachers say, counterproductive. One difficulty arises from the fact that students may have learned much more than their role allows them to show. For example, in a mock trial, a student who is assigned the role of the bailiff may actually help one of the legal teams prepare their case and may learn a great deal from listening to the case and the jury deliberations, but has little opportunity to show that learning in his/her role as bailiff. In addition, in complex simulations in which action is occurring on several fronts simultaneously, the teacher may have difficulty watching and assessing all the action. While some teachers have tried videotaping simulations to avoid this problem, watching all of the videotape creates a major time burden. Finally, many teachers have found that if they are marking students while the simulation is occurring, it can stifle students' creativity and enjoyment.

Not using the simulation as an assessment task does not mean that teachers should not communicate to students their expectations, however. Expectations can be communicated by providing students with a checklist of behaviors that contribute to a successful simulation. An example of such a checklist for a simulated congressional hearing is shown below. Many teachers find it effective to show video clips of previously conducted simulations from which students can generate their own lists of positive and negative behaviors. Teachers who have used this strategy find that students create even more comprehensive lists than the teachers themselves.

Checklist of Desirable Behaviors in a Mock Congressional Hearing

- Speaks clearly and loudly, making eye contact with members of the congressional committee.
- Has notes available but does not read from them.
- Listens carefully while others are speaking.
- Answers questions directly; asks for clarification if needed.
- Avoids repeating same points.
- Uses examples to support points.
- Cites sources.

To assess what students learned through the simulation, many teachers use a follow-up assignment in which students write about the experience (e.g., a journalistic account of what transpired, a legal brief or decision, a letter to the editor or to a public official, or a standard essay) or create a product (e.g., a poster, persuasive brochure) that presents what they have learned.

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Published Simulations

The following are only a few examples of published simulations that address the geography standards. Many of the publishers of these materials have produced other materials that would be of interest to geography teachers as well.

Amazon Trail, The (Minneapolis, MN: MECC, 1993). In this computer simulation, students must make decisions and avoid danger as they search the basin of the Amazon for cinchona.

Balance, by David Young and Paul DeKock (Lakeside, CA: Interact, n.d.). Students simulate 150 years of history in a specific geographic area, looking at the effects of human activities on the ecosystem.

Decisions, Decisions: The Environment (Watertown, MA: Tom Snyder, n.d.). Playing the roles of a mayor and his/her advisors, students search for a solution to a fish kill in the town's pond.

Explosion (Lakeside, CA: Interact, n.d.). This simulation focuses on population growth and its effects on both human and physical systems. Students examine the issues and then act as policy makers to enact legislation addressing population-related problems.

Flight (Lakeside, CA: Interact, n.d.). Working in three-member teams, students plan a cross-continent flight using daily weather reports and maps and responding to problems that the simulation poses. Each day, they write in their flight diaries.

Geography Search (Watertown, MA: Tom Snyder, 1993). In this computer simulation, students act as explorers in the Age of Exploration, navigating by the stars, learning about trade winds, and facing the unknown as they race to discover a new world.

"Hey Kid! Don't Let Go of that Balloon!" by David J.W. Vanderhoof, *Update on Law-Related Education* 17, no. 3 (1993), pp. 44-51. This simulation deals with a controversial issue of interest to students—releasing helium balloons into the atmosphere—as the focal point for teaching how laws are enacted and how opinions on such issues can be influenced.

Living in a Global Age (Stanford, CA: SPICE, 1992). In this simulation, students explore issues related to global trade and interdependence as they work together to assemble flashlights. The simulation requires negotiation and cooperation in order for groups to gather the resources needed for the task.

Ocean Expeditions: El Niño (Watertown, MA: Tom Snyder, n.d.). Students work in teams of four simulating a research team on a ship studying climate. Students use NASA and NCAA data to determine if an El Niño weather pattern is forming.

Survival, by Charlene Beeler (Lakeside, CA: Interact, n.d.). Students representing various special interests related to a range of energy sources face questions from consumers, public officials, reporters, and environmentalists. A legislative committee then holds hearings on and votes on energy bills.

Teaching about Global Awareness with Simulations and Games, by Steven L. Lamy et al. (Denver, CO: Center for Teaching International Relations, 1994). This resource provides directions for simulations on four global themes: development and technology, world trade and interdependency, politics, and human rights.

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References:

Gallagher, Arlene, *The Methods Book: Strategies for Law-Focused Education* (Chicago, IL: Law in American Society Foundation, 1979).

Taylor, John L., and Rex Walford, *Simulation in the Classroom* (Baltimore, MD: Penguin Books, 1972).

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ENVIRONMENT AND SOCIETY

17. Decisions About Land Use: Mrs. Howard's Pasture

Overview:

Decisions affecting the character and use of a particular area of land are made daily, often with very little information or consideration of the alternatives. Small groups of individuals, such as a city council or county commissioners, often make such decisions. Yet land use issues are seldom clear-cut; they are complex and often involve trade-offs. For this reason, open hearings have been established to enable local or state leaders to determine what citizens' views on these matters are.

This lesson provides students an opportunity to look at a land-use issue. Through a role play, students determine how a land-use decision would affect each individual involved, look at pros and cons of the proposed use of the land, and decide what use would benefit the majority of citizens involved.

Objectives: At the end of this lesson, students will be able to:

1. List a variety of purposes for which land can be used.
2. Explain why land-use issues can be very controversial.
3. Analyze a land-use issue and determine the effects of various alternatives.
4. Synthesize information on a land-use issue and come to consensus on the best solution.
5. Appreciate analysis and consensus building as methods of decision-making.
6. Value individual citizen input in decisions that have a community impact.

Standards Addressed: 14, 16, 18

Theme Addressed: Relationships within Places

Time Required: 2-3 class periods

Materials and Preparation: Make copies of Handout 17-1 for all students. Make one set of the role cards. Prior to using the lesson, you may wish to review the roles and determine the group assignments accordingly. You may also wish to make an overhead of the questions in step 6 of the **Procedures**.

Developed by Janice V. Pearson, Northglenn, Colorado; reprinted from *Science/Technology/Society: Activities and Resources for Secondary Science and Social Studies* (Boulder, CO: Social Science Education Consortium, 1995).

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Procedures:

1. Open the lesson with a brief discussion of the need for individual citizens to participate in community decision-making, particularly on issues that could affect the economics of individuals and the community, as well as the environment. Continue by telling students that many issues affect a community. One such issue that often causes a great deal of controversy is land use. People have different ideas about the best use for a piece of land. All of the people affected by how a piece of land will be used have a right to help determine the best use for the land.

2. Give each student a copy of Handout 17-1. Have each student read the case study or assign one or more volunteers to read the case study aloud.

3. Ask students to brainstorm a list of ways in which Mrs. Howard's pasture might be used. Write this list on the chalkboard. Don't eliminate any suggestions—all are valuable.

4. Next, see if there are ways items on this list can be combined. For example, suggested ways of using the land might be categorized as recreational, industrial, commercial, residential, etc.

5. Divide the class into seven groups. Tell each group to select one person to act as group spokesperson. Give each group a role card. Have groups review their roles and discuss the use of the land that each is proposing.

6. To help groups evaluate their proposals, ask them to consider the following questions. These questions will stimulate thinking about the proposal and will suggest points that can be presented to the city council for consideration. You may want to put the questions on an overhead.

- What is the science or technology involved with your proposal?
- What is the social issue involved with your proposal?
- Would this proposal be controversial? If yes, in what way?
- How would this proposal benefit the residents of Angel Harbor?
- Will this proposal create new jobs or leave people without jobs?
- Describe the impact this proposal would have on the community of Angel Harbor.
- Would this be a positive or negative impact?
- How would this proposal change the ecology of the area?

7. Allow groups time to prepare a presentation that the group spokesperson will make to the city council. This presentation should be designed to convince the city council that a particular proposal is the best one for Angel Harbor.

8. Prior to the presentations of the proposals, select one student from each group to act as a city council member. Students who are not group spokespersons or city council members will represent the citizens of Angel Harbor and can ask questions of the spokespersons.

9. As the spokespersons present their proposals, the city council members should listen to the arguments and the questions raised by the citizens of Angel Harbor.

10. After all the spokespersons have reported and the citizens have asked any questions they have, summarize the input from the groups. You might make a chart on the chalkboard and list responses to the following questions:

- What is the science or technology involved with each proposal?

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- What is the social issue involved with each proposal?
- Which of the proposed uses of the land would create the most controversy? Why?
- Which of the proposed uses of the land would be most beneficial to the residents of Angel Harbor?
- Which of the proposed uses of the land would be least beneficial to the residents of Angel Harbor?
- Which of the proposed uses of the land would affect taxes?
- Which of the proposed uses of the land would affect people's lifestyles? How?
- Which of the proposed uses of the land would create new jobs?
- Which of the proposed uses of the land would leave people without jobs?
- Is this piece of land suited to each proposed use? In what way?
- How will each proposed use affect the ecology of this area?
- What are the pros and cons of each proposal?

11. After these questions have been discussed, ask the members of the city council to deliberate for a few minutes and determine the one proposal that seems to be best for the residents of Angel Harbor. After deliberation, have the city council members announce their decision, giving reasons for their selection.

12. Discuss the decision with the class. Take a poll or use a show of hands to determine how many students agree with the decision of the city council. Ask students if they think this method of decision-making is fair. Would this be a good way for cities to make important decisions, such as land-use decisions?

13. Conclude by asking students what they learned from participating in this kind of activity. Also ask students to comment on why it is important for citizens to become involved in community decision-making.

Extension/Enrichment:

1. Have students explore their neighborhoods to find proposed zoning changes or requests for variance. Good places to look include vacant lots or large parcels of empty land, on buildings in older neighborhoods that are undergoing changes, or in areas where new construction is starting. Tell students to examine the signs for the following information:

- What is being requested—a zoning change or a variance.
- When the hearing will be held.
- What city or county agency is holding the hearing.

Students might contact someone living next to or near this land to find out his or her opinion about the proposed change and then report their findings to the class.

2. Plan a field trip to a meeting of a city or county planning commission so students can see firsthand the work that is done in determining uses for community lands.

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MRS. HOWARD'S PASTURE

Angel Harbor is a bustling community of 48,000 people. Its primary industries are fishing, lumbering, and the manufacture of fishing equipment and furniture. Angel Harbor is located on the ocean. The Angel River, a small river fed by mountain springs, flows through the center of the city on its way to the ocean. The river provides water for farms outside of the city. Angel Harbor has numerous parks and recreation facilities along the river.

Eleanor Howard has lived in Angel Harbor all her life. Her big house sits along the river on the edge of town. She has about 200 acres of land around her home, which she uses as pasture for her herd of horses. Recently, Mrs. Howard deeded 30 acres of riverfront pasture land to the community, with the requirement that the city council determine a use for the land that would be most beneficial for the majority of the community.

The city council encouraged the entire community to present proposals for the use of the land. The council received seven proposals. The council must now decide which proposal is the best one for the community. A town meeting has been scheduled. At this meeting, the seven proposals will be discussed by citizens and the city council.

Directions:

1. Your group will represent one of the people presenting a proposal to the council. First read your role. Then develop a presentation that will convince the city council and the community that your plan is the best one.

2. Select one member of the group to be the spokesperson. He or she will argue your group's position at the town meeting.

3. The teacher will pick one person from each group to serve as a member of the city council. The rest of the group members will represent citizens of Angel Harbor and should listen to the arguments made by each of the seven spokespersons and ask questions. The questions should help the city council decide which proposal really is the best one for the people of Angel Harbor.

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ROLE CARDS

1. Peter Blair

I represent a group of individuals who would like to build an amusement park for Angel Harbor. We feel this type of entertainment would be beneficial to the city. It would provide a place for adults and children to enjoy themselves, particularly on the weekends and evenings during the summer months. An amusement park would also be a tourist attraction. The people who would come to enjoy the amusement park would also eat at local restaurants and buy gasoline and other products from local merchants, thus adding to our economy.

The amusement park would add approximately 20 jobs for local residents. Because the land in question is on the edge of Angel Harbor, the music and lights of the amusement park would not be a nuisance to the residents of the community. There would be no cost to the city. The investment group would pay for the entire development.

2. Fay English

The land donated to the city by Mrs. Howard is priceless. This land is home to many kinds of animals. White-tail deer are frequently seen drinking from the river in the early morning and late evening. Several varieties of ducks and geese spend the winter in this area. We have beaver and muskrat on the river banks. And the river is teeming with all kinds of fish.

It would be in the best interests of the citizens of Angel Harbor to maintain this land in its natural state, a wildlife preserve. We could build a parking facility near the highway and trails to and from the river. This would allow people to study the wildlife in this area while safeguarding the habitat for these local species. The cost to the city would be approximately $5,000 for the parking area and $2,500 for the trail and trail markers. I am certain that many of the service organizations in our city would see this as a worthwhile community project and would donate both time and money to the development of a wildlife preserve.

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3. Bob Evans

We need moderate-priced housing in Angel Harbor. High-paid professionals can choose from many new and older homes, but many workers and retired persons cannot spend $80,000 to $100,000 for a home. My company, Evans Brothers Homes, would like to purchase the land donated to Angel Harbor by Mrs. Howard. We would offer fair market price for the land. In turn, we would build single-family condominiums on the land. We would sell each unit for $58,000 to $67,000, depending on the number of bedrooms and other options desired by the buyer.

We anticipate that 60 condos could be built on this land. This development would be attractive and would add to the tax base for our community and school system.

4. Evelyn Cooper

This city needs a good family restaurant. We have fast-food restaurants and gourmet restaurants. But we need a restaurant that caters to families with big appetites and not too much money. What better place to build a restaurant than in a pleasant country setting?

I would like to purchase this land from the city. On the land I would build my restaurant. It would be built close to the river so that access on and off the main road would not cause congestion. My new restaurant would create jobs for 15 Angel Harbor residents.

5. Bill Dunn

Angel Harbor's citizens take pride in their community. We are careful to keep our city clean and attractive. However, our fair city will soon experience a garbage disposal problem if alternatives are not found. As city sanitation manager, I have studied Angel harbor's solid waste treatment methods. If Angel Harbor continues to dispose of its solid waste at the municipal landfill, the landfill will be completely filled in seven years.

I am proposing a recycling center for such materials as paper, glass, aluminum cans, and other metal products. This center would not need the entire 30 acres of land and could be built near the main road. The initial cost to the city would be $60,000, but it would extend the life of the landfill by 25 years and would earn $25,000 each year. The City Council would need to make recycling mandatory to make my plan work.

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6. Calvin Bristow

I am the girl's and boy's basketball and baseball coach at Angel Harbor Junior High School. I believe the children and adults of Angel Harbor need a better place for their recreational sports. The facilities available at the schools are adequate for school sports, but many adult and student softball and soccer leagues need fields on which to play and practice. I propose that the city build two baseball fields, four softball fields, and four soccer fields, along with stands for spectators, a concession area, dressing facilities for males and females, and a parking area to serve the entire complex. The complex would cost $30,000 to build. Through donations and community projects to raise funds, however, the city would not have to spend more than $15,000.

7. Maureen Vincent

As a safety engineer hired by the city of Angel Harbor, I recommend that the Howard land be used to build a new fire station. This city is experiencing a great deal of growth, particularly to the north of the city, toward Mrs. Howard's land. Right now, the homes on the north end of town depend on the Russell Street Station eight miles away. This may not seem like a great distance, but when your home is burning, seconds count.

I encourage the city council to annex this land and use it to build a new fire station. The cost of $1.3 million dollars would need to be raised through a tax increase.

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18. Looking at Japanese Geography Through Art and Literature

Overview:

Ukiyo-e, the art of the Japanese woodblock print, can be used to teach about geography and culture. In particular, the landscape prints of Hokusai and Hiroshige are wonderful sources of information that can prompt discussion and exploration of the physical and human characteristics of places, people's perceptions of places and regions, and physical processes that have shaped Japan. This lesson asks students to examine a small number of *ukiyo-e* landscape prints to develop hypotheses about the geographic features of Japan. Students are also asked to read or listen to passages from literature to discover information related to natural disasters in Japan. They then conduct research and write papers synthesizing what they have learned from a variety of sources.

Objectives: At the end of this lesson, students will be able to:

1. Identify physical features of Japan.
2. Identify and explain natural disasters common to Japan.
3. Interpret cultural and geographic information from art and literature.

Standards Addressed: 4, 6, 7, 15

Themes Addressed: Place, Relationships within Places, Region

Time Required: 2-3 class periods

Materials and Preparation: You will need copies of Handout 18-1 for all students; a copy of *The Big Wave*, by Pearl Buck (New York: Harper Trophy, 1976); resource materials for students to use in their research on physical features of Japan; the May 1993 issue of *Discover* magazine or other sources with information about recent tsunamis to hit Japan; and eight to twelve *ukiyo-e* landscape prints. Art books containing such prints are listed below (many can be found in libraries); postcards of Japanese prints are available from Dover (180 Varick Street, New York, NY 10014; 800/223-3130). Calendars produced by art museums may also display such prints. Questions teachers should consider in selecting prints are provided in the **Teacher Background Information**. Try to choose prints with a variety of landforms: mountains, rivers, plains, coastal regions, etc. "The Big Wave Off Kanagawa" and "Red Fuji" should be two of the prints used. Students will be examining the prints so you will need to decide on a format for presenting them. You can make color copies of the prints and place them in plastic protectors or laminate them. You can purchase postcards from Dover, or you can take

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Developed by Donna Merlau, Onondaga Central Junior/Senior High School, Nedrow, New York.

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slides of the prints you selected. If you are using color copies or postcards, you will need to number them to facilitate the subsequent discussion. Numbering can be done using 1" x 2" self-adhesive notes. The prints can be passed among the small groups or posted on the classroom walls. There are also a number of websites displaying *ukiyo-e* prints. If you are technologically oriented, you could download selected images to create a disc students could use to examine the prints. To locate sites, simply search for *ukiyo-e*.

Print sources of *ukiyo-e* prints include the following:

The Thirty-Six Views of Mount Fuji, by Hokusai (Toyko: Heibonsha Ltd. Publications, 1968).

Library of Japanese Art: Hokusai, English text by Elise Grilli, based upon the Japanese text of Ichitaro Kondo (Tokyo: Charles E. Tuttle Co., 1957).

Hiroshige: Japan's Great Landscape Artist, by Isaburo Oka (Tokyo: Kodansha International, 1992).

Images from the Floating World: The Japanese Print, by Richard Lane (New York: Konecky and Konecky, 1978).

Japanese Prints, by James T. Ulak (New York: Abbeville Press, 1995).

Japanese Prints, by Nathaniel Harris (London: Studio Editions Ltd., 1994).

Ukiyo-e, by Sado Kikuchi (Tokyo: Hoikusha Publishing Co., 1984).

Ukiyo-e: The Art of Japanese Woodblock Prints, edited by Amy Newland and Chris Uhlenbeck (New York: Smithmark Publishers, 1994).

Art of Edo Japan: The Artist and the City, by Christine Guth (New York: Harry N. Abrams, 1996).

Great Works of Japanese Graphic Art, by Douglas Mannering (Hartsdale, NY: Shooting Star Press, 1995).

How to Look at Japanese Art, by Stephen Addis with Audrey Yoshiko Seo (New York: Harry N. Abrams, 1996).

Procedure:

1. Welcome students to the museum of 19th-century Japanese art, explaining that students will be looking at examples of *ukiyo-e* that show elements of the Japanese landscape. You may want to provide some brief background information about this art form.

2. Distribute Handout 18-1 and tell students they will use it in analyzing the prints you have selected. They are to observe the features, objects, and activities they see in each print and record their observations on the handout. This can be done in small groups, individually, or as a whole class (if using slides).

3. Have students, in small groups, discuss what they saw in each print, particularly noting commonalities among the prints and why they think these commonalities might be occurring. Also ask students to speculate on what aspects of Japanese culture or geography are not represented in the prints. Why might these elements be missing?

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4. As a class, focus on the "Big Wave" print. Stimulate student discussion using such questions as:

- What place is depicted in the print?
- What is happening in the print?
- What do you think caused the wave? Could it be a tsunami? Why or why not?
- What are the people in the print doing?
- How are people depicted? Why do you think the artist depicted them in this way? What might the artist be saying about the forces of nature?
- Why do you think Mt. Fuji is depicted in the background?

5. Next, focus on the print "Red Fuji." Use such questions as the following to stimulate discussion:

- What is shown in this print?
- Why do you think the author used red?
- What is missing from this print? Why do you think this is true?
- What is the significance of Fuji in Japan?

6. Continue the discussion by asking students to think about their observations and discussions of the prints as they answer the following questions:

- What physical features are important to Japan?
- What economic activities were important to Japan in the 19th century?
- What natural disasters appear to occur in Japan?

Record student responses so they can refine or correct them later in the lesson.

7. Inform students that they are next going to use literature to learn more about natural disasters that occur in Japan. Read an excerpt from *The Big Wave*, by Pearl Buck (read through the boys' return from their outing to the cove). Ask students to describe the story setting, the place in which the story occurs. Continue reading through the story of the tsunami, concluding with the sentence "His family and his home were gone." Conduct a discussion around the following questions:

- What happened in the story?
- How did these events impact the people?
- What similarities do you see between the story and the artwork we examined?

8. If the May 1994 *Discover* magazine is available, show students pictures of the destruction caused by the tsunami that hit Japan in 1993 or use other sources to show students the recent effects of tsunamis. Ask students to speculate on how the Japanese people adapt to such natural disasters as tsunamis and earthquakes. Add their hypotheses to the list of statements about Japan. Also allow students to refine or correct their statements based on their inferences from the literary works.

9. Ask each student to choose a landform or natural disaster that the class has concluded is important to Japan. Students are to research their chosen topic and write a paper focusing on how this landform or natural disaster has affected the people of Japan, both in the past and the present. Encourage students to use artwork and literature in their papers, as well as information gathered from more traditional reference sources.

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Extension/Enrichment:

1. Have students locate current examples of Japanese prints and compare these with the 19th-century examples they studied in this lesson. What do changes in this Japanese art form suggest about changes in Japanese society? How could students verify their hypotheses?

2. Contemporary artists sometimes incorporate imagery from the "Big Wave" and "Red Fuji" prints. For example, a clean water campaign in Japan incorporated the "Big Wave" image, showing trash-filled water and the caption "Little by little our waters are looking less like art and more like trash." Ask students to find examples of artwork that incorporates images from these two prints. What are the differences between the new and original versions. Why did the artist choose this image to alter? What message is the contemporary artist trying to convey by using the image?

Teacher Background Information:

Ukiyo-e prints were developed in the late 1500s and early 1600s. They began as black-and-white prints used to illustrate short stories. The landscape genre of prints, which became popular in the early 1820s, reflects everyday life of the farmers, artisans, merchants, and *chonin* or townspeople. Two of the most popular landscape artists were Hokusai and Hiroshige, although such others as Kuniyoshi and Eisen created landscapes as well.

Landscape prints illustrate mountains, rivers, land usage (e.g., farming), fishing, and religious, cultural, and historical artifacts. Several series of prints illustrate travel on the Tokaido Road, which connected Edo, the capital of the Tukugawa Shogunate, and Kyoto, the imperial capital. These series can be used to talk about travel and travel conditions during the early to mid-19th century. Series that focus on views of Mt. Fuji and on Edo were also created.

The "Big Wave of Kanagawa" by Hokusai is one of the best-known Japanese woodblock prints from the period. It depicts a large wave in the foreground with curled, frothy edges about to overwhelm fishermen in their boats. In the background is Mt. Fuji. In this print humans appear powerless against the forces of nature.

Eight to twelve well-chosen prints can provide a wealth of information for discussion and research. Students can be asked to examine a number of prints and draw conclusions or write generalizations. Prints can be displayed and students working in small groups can visit each display site. Students can also work in small groups at desks, with prints circulated among the groups.

Teachers should consider the following questions when choosing prints:

- What cultural, historical, and geographic features of Japan do I want students to recognize? Can these be found in the prints available? If I can't find them in the prints, were they part of the historical context?
- Is the print interesting visually? Does it contain information I want to convey? Try to pick pictures that are engaging and will attract the curiosity of your students.
- Do I understand what is happening in the print? Can I identify artifacts and actions? If not, can I found out about these things? Students inevitably see things we don't. Be prepared to answer questions or know where to find information when you need it.
- Is the print appropriate for the age group I am teaching? Be aware that not all *ukiyo-e* prints are landscape oriented. Many depict kabuki actors, geisha, the supernatural, as well as erotica. Do not just pass around a book containing a random sample of prints!

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LOOKING AT JAPANESE GEOGRAPHY THROUGH ART

Examine each print carefully. For each print give a brief description. Tell what physical features, objects, and actions are present. This information will be used in small-group discussion.

Picture #	Description	Physical Features	Objects	Actions

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In your group, discuss these questions:

1. What common elements do you notice when you compare these prints?

2. Why might the artist have done this?

3. What is missing from these views of Japan?

4. Why might this be?

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19. The Effect of Topography on Human Systems

Overview:

This lesson requires middle school students to make inferences about human/environmental interaction by creating a simulated topographic environment. Participants work cooperatively to create a unique raised relief map (made of crumpled paper). Each group identifies probable occupations found on the specific landforms shown on their "maps." Since 90 percent of the world's population lives on plains, these maps should demonstrate the advantages of level land for farming, commerce, and industry. By labeling transportation systems that link resources found in one area with factories and markets found in another, students gain an understanding of primary (agriculture, mining, forestry, fishing) and secondary (manufacturing) economic activities.

Objectives: At the end of this lesson, students will be able to:

1. Describe the physical characteristics of the three major landforms: mountains, plateaus, and plains.

2. Locate major mountain ranges, plateaus, and river valleys on a world map.

3. Describe how people live on selected topographic features.

4. Demonstrate, by constructing a raised relief map, why plains are the most favorable site for human development.

5. Make inferences about interdependence and movement.

Standards Addressed: 2, 3, 11, 15

Themes Addressed: Location, Relationships within Places, Movement, Regions

Time Required: 3-5 class periods

Materials and Preparation: You will need copies of Handout 19-1 for all students. You will also need a large population density map of the world, a classroom set of atlases, magic markers, and several rolls of brown medium-weight wrapping paper. You will also need print resources on five physical features—mountains, plateaus, plains, river valleys, and coastline—as well as several photographs of each of these features; some of these photographs should show human activities. *National Geographic* is one good source of such photographs. A large wall map of the world would also be helpful.

Developed by Susan B. Meisler, Vernon Center Middle School, Vernon, Connecticut.

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Procedure:

1. Display a large population density map of the world and ask students to identify where the most heavily populated areas are located (middle latitude plains and river valleys in the eastern United States, western Europe, and eastern and southern Asia). Ask students to speculate about why so many people live in these regions and how they make their livings. Record their responses. Tell students they will gather evidence to answer these questions in this lesson and will return to see how accurate their hypotheses were at the end of the lesson.

2. Divide the class into groups of five students. Distribute Handout 19-1 and student atlases and direct students to complete the handout.

3. Go over the handout with students. If you have a large wall map of the world, have each group locate at least one of the examples they found on the world map.

4. Give each group several photographs of landforms. Ask the groups to identify the feature shown in each photograph and then to describe in as much detail as possible any human activity that is shown. Each group should have the opportunity to describe one of their photographs aloud to the class. Following each description, lead a brief class discussion that emphasizes the themes of physical and human characteristics of place, region, human interaction with the environment, and movement.

5. To prepare for a jigsaw activity, have students within their groups count off from 1 to 5; then have new groups formed by number (all the 1s form a group, the 2s, etc.). Each numbered group will become expert on one of the physical features—mountains, plateaus, plains, river valleys, and coastlines; to do so they will need resource materials on their assigned feature. They are to find out more about this physical feature, especially in terms of its potential for human development; they will share this information with the other members of their original group.

6. When groups have completed their research, have students return to their original groups and teach their group members about their assigned physical features.

7. Introduce the concept of primary and secondary economic activities. Primary production refers to activities dependent upon natural resources, such as farming, mining, fishing, and forestry. Ask students what primary production activities occur in regions with the physical features they studied. Secondary production refers to the transformation of raw materials into finished goods. Factories are located where resources, labor, and energy are brought together to produce a finished product, which is then shipped to markets. Again, ask students what secondary production activities they found occur in regions with the physical features they studied. Point out that technology can change human/environment interactions. For example, irrigation systems make farming possible in dry areas; advanced transportation systems allow products to be transported by air, when they might only have been transportable by water in the past.

8. Tell the groups that they are going to demonstrate what they have learned by creating three-dimensional representations of unique countries in the middle latitudes. Give each group a large sheet of brown wrapping paper. They are to crush the paper and then slowly unfold it to form the topography of their country. When they have unfolded the "map," group members should draw symbols to identify economic activities, types of recreation, transportation systems, population density, etc. Tears can be river valleys, irregular edges can be harbors, and so on. Each group should develop four general statements about how and why people live in certain areas; these statements should be supported by their map.

9. Place the maps on the floor. Ask a spokesperson from each group to explain the group's generalizations and point out supporting evidence. The appropriate location of certain resources, economic activities, transportation systems, and areas of population density on specific landforms are all

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examples of supporting evidence. As students present their maps, ask them to identify which economic activities they have shown are primary and which are secondary. The **Teacher Background Information** may be helpful in evaluating students' presentations.

10. Return to the questions you posed at the beginning of the lesson and ask students to evaluate the answers they gave at that time. Now why do they think so many people live in these regions? What economic activities do they think are important there?

11. As an assessment activity, each student could pick a particular country. The student could examine a physical map, land use map, and population density map of that country for evidence to confirm or invalidate one of his/her group's generalizations about how and why people live in certain areas. The student could then write a paragraph explaining how the maps do or do not support the generalization.

Extension/Enrichment:

1. Introduce a climate map to add another variable. In middle and high latitude climates, plains are often colder and drier than surrounding lands. In low latitudes, plateaus like those in eastern Africa and Latin America offer cooler climates that may be desirable. Students should be able to make these inferences by examining maps showing population density on low latitude plateaus as opposed to plains. They might consider how activities in the countries they created would be different if the countries were located in the low latitudes.

2. Give students specific case studies in which they must analyze a problem in a particular area by looking at a relief map. The following questions relate to areas worthy of investigation:

- In what direction do the rivers of Russia flow? Why might that be a problem?
- What part of China is the most densely populated? The most sparsely populated? Why?
- Where are most Japanese cities located? Why? Why is this archipelago well suited for trade?
- Why are both western China and the Great Plains of the United States dry? What occupations are suited to arid or semi-arid climates?

3. Ask students to use climate and physical maps to explain the contradictions inherent in the following questions:

- What parts of the African continent might have the highest population density? Why? Although mountain regions are generally sparsely populated, why might the eastern highlands of Africa be an exception?
- Quito, Ecuador, and Manaus, Brazil, are two South American cities located close to the equator. How would topography explain why the population of Quito is far greater than that of Manaus?

4. Emily Pelkey, a graduate student at the University of Colorado, has posted an interesting geography project on the Internet. The project involves students in gathering information and exchanging it with key pals in other parts of the country. One feature of the project is a survey on landforms (http://ucsub.Colorado.edu/~pelkey/landforms.html), which could be adapted for a data collection and information exchange project that extends this lesson.

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Teacher Background Information:

The following information should be included in students' map presentations.

Ninety percent of the world's population lives on plain because they offer the greatest opportunities for survival. Level land makes farming easy. River valleys are sources of fertile soil and water for irrigation. Large farm machinery can be readily used on plains, and transportation to markets is inexpensive. Cities provide factory workers and markets for products, as well as service industries (and employment opportunities). Construction of factories and transportation systems for moving goods is easy. River valleys and coastal cities are often centers of trade and tourism.

Mountains are potential sources of lumber, minerals, and hydroelectric power. Unique forms of recreation (skiing, mountain climbing, scenery) make tourism popular. Herding sheep and goats on higher slopes and cattle on lower slopes make good use of land. Farming exists on valleys and along terraced hillsides. Altitude affects rainfall and temperature. Transportation is difficult and expensive due to barriers that also provide protection against invasion.

Plateaus often have semi-arid climates suitable for dry (grain) farming and grazing animals. Altitude makes tropical plateaus more densely populated than plateaus located in the high latitudes. Transportation is difficult and expensive.

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HOW DO YOU SPELL *RELIEF*?

Define the following terms:

1. Mountain

2. Plateau

3. Plains

4. River Valley

5. Coastline

Using an atlas, identify places beginning with the ten letters in the word *topography*. All five of the physical features listed above should be represented in your list of places.

T_____

O_____

P_____

O_____

G_____

R_____

A_____

P_____

H_____

Y_____

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20. TIMBER!

Overview:

People rely on wood from trees to heat their homes, cook their food, and provide building materials and paper for homes, schools, and businesses. The more people there are, the greater the demand for wood. While it takes only seconds to cut down a tree, it takes years to grow a new one. We also depend upon forests to regulate climate, clean air and water, conserve precious soil, and provide homes for many birds and animals. In almost every part of the world, trees are being cut down at a faster rate than they are being replaced.

In this role-playing simulation, students observe what happens to a forest when the demand for wood is greater than the supply. They then plan and implement a tree-planting service project.

Objectives: At the end of this lesson, students will be able to:

1. Complete a chart, calculating the number of trees being planted and cut in a forest as demand for wood increases.

2. List ways that forests can be preserved and what individuals can do to conserve tree products.

3. Explain the importance of trees as a resource.

Standards Addressed: 14, 16

Theme Addressed: Relationships within Places

Materials and Preparation: For each group of four students you will need: 120 craft (popsicle) sticks in a coffee can with a rubber band around them, 32 craft sticks in a rubber band, and a stopwatch or clock with a second hand. For help in organizing a tree-planting project and securing saplings, contact a local nursery (which may wish to sponsor the event for great community publicity) or contact The National Arbor Day Foundation at 211 North 12th Street, Lincoln, NE 68508; 402/474-5655 for more information.

Procedure:

1. Divide the class into groups of four students. For each group, assign the following roles: lumberjack, forest, forest manager, timer.

2. Give 120 craft sticks in a coffee can to each student representing the forest. These sticks represent the supply of trees available to the lumberjack for cutting.

Adapted from *Two Cans and Toucans: Exploring Shrinking Habitat* developed by Biological Sciences Curriculum Study (BSCS), Colorado Springs, CO, for The National Science Foundation's National Science and Technology Week packet, © 1990.

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3. Give 32 craft sticks to the students representing the forest managers. These sticks represent trees that will grow during the game.

4. The lumberjack records the transfer of trees each minute on a chart like the one illustrated.

Minutes	Number of trees at beginning of minute	Number of new trees	Number of trees cut	Number of trees at end of minute
1	120	+4	-1	123
2				
3				
4				
5				
6				
7				
8				

5. Begin the game when the timer gives the signal. After 15 seconds, the timer tells the forest manager to give the forest one tree. Every 15 seconds for the rest of the game, the forest manager adds another tree to the forest. In doing so, the forest manager simulates the average rate at which trees grow to maturity and become timber reserves in the real world.

6. Stop at the end of the first minute of the game and let the lumberjack remove one tree from the forest. The tree represents the amount of wood the world needs for heating, cooking, and building materials at its present population.

7. Continue the game. At the end of each succeeding minute, the world's demand for wood doubles as a result of a growing population. At the end of the second minute, the lumberjack cuts two trees from the forest; at the end of the third minute, the lumberjack cuts four trees from the forest, and so on.

8. End the game when the wood reserves in the forest can no longer meet the demands of the lumberjack.

9. Conduct a debriefing discussion using the following questions:

- How many minutes did it take for the lumberjack to cut all the trees in the forest? (Just over seven minutes. At seven minutes there would only be 21 trees left.)
- Was the forest always shrinking? Explain. (No. After the first minute, the forest increased by two trees and stabilized for another minute. After the third minute, the doubling of forest use led to the end of the forest.)
- If the forest manager could develop a tree that grows at a rate of one tree per second, would tree growth keep up with the timer demand? Why not? (No. The doubling of forest use due to increased population size would still lead to the demise of the forest. If the simulation was done with 60 sticks given to the forest each minute, it would only increase the life of the forest by two more minutes.)

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- What could be done to prevent the demise of the forest? (The forest can be maintained only if we cut down what can be replaced and no more. This means conserving our use of tree products such as paper and lumber. However, if the human population continues to grow, so will the demand for these items.)

10. Lead a brainstorming session with students on ways to conserve paper at home and in school in order to save trees. Write these on the board and try to implement the more practical ideas in the classroom, such as using both sides of the paper.

11. Help students organize a schoolwide tree-planting day, where trees are planted on the school grounds. The **Active Teaching: Service Learning** feature on page 197 may be helpful in planning and implementing this project.

12. Following the service project, provide an opportunity for structured reflection through a discussion or writing assignment.

Extension/Enrichment:

Read students Ogden Nash's well-known verse about trees and billboards. Invite students to write their own short verses about trees. These could be in the form of limericks, haiku, or any other rhyming or nonrhyming form.

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Active Teaching: Using the Internet

Introduction

In the 1960s, public pressure influenced education in the United States to change because of the space race. Now, in the 1990s, space is again driving public demand for educational change. Today, however, it is not planetary and deep space that is stimulating the change, but rather cyberspace—the online world of computers and Internet communication and information.

What follows is an attempt to provide practical and useful information for taking advantage of the Internet as a tool to teach geography. The information provided is based on the following assumptions: (1) the public expects teachers to provide online, Internet instructional experiences for students; (2) the Internet can be a valuable instructional tool; (3) many teachers need assistance in learning how best to utilize the Internet as an instructional devise; and (4) without practical information and instruction, the Internet will fare no better than other excellent materials produced in previous cycles of reform.

What Is the Internet?

The Internet is a massive network of servers (Internet-dedicated computers that serve as gateways to the Internet and/or collection of files that Internet users might desire). The Internet provides users access to communication and information.

The Internet also provides organizations (and individuals) a means to electronically publish their own information. The Internet grew out of a Department of Defense project in the 1960s called ARAPANET, which at one time linked 23 computers on university campuses for the purposes of information-sharing. The computers were linked by way of a standard computer language so that different computers could "talk" with one another.

With the popularization of personal computers in homes, offices, and schools in the 1980s and 1990s, demand for information from network servers increased dramatically. Among the first network servers were library catalogues. Today, vast quantities of information have accumulated and are added each day to computers linked by the Internet. What was once a computer network linked to university research has today an estimated 20 to 30 million users worldwide. The following sections describe several ways the Internet might be used to teach geography and the essential tools a potential user needs to join this growing population of global "netizens."

Teaching and Learning Geography via the Internet

In a small middle school in rural eastern Colorado, a world geography teacher conducts an Internet search for information on China. Teaching a unit on cultural geography, she wants to present her students with up-to-date information on rapid changes taking place in China. Through the Internet, she discovers the following: A lesson plan on geography and culture written by a middle school teacher in Oregon; *China Today*, an extensive China data base managed by the Interpacific Development Co.; *Chinese New Digest*, a weekly newsmagazine; and *China Daily On-Line*, the only daily English news-

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Developed by Ron Schukar, Social Science Education Consortium.

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paper available in China. With this information she can supplement her five-year-old textbooks and enhance her curriculum with current and relevant information.

In a large inner-city school, students enrolled in a physical geography class are asked to conduct research on cartography using the Internet. Online, students gather information from the following: Geo System—A History of Cartography; John R. Borchert Map Library, University of Minnesota—History of Cartography; Heritage Antique Map Museum, map images; and Map Hist, an online discussion group on the history of cartography. With the aid of the Internet, students enrich their research, view a variety of map images and observe changes in map-making, and communicate directly with experts and those with an interest in cartography.

Most geographical studies can be enhanced with the Internet. Among the ways that teachers and students can benefit from the Internet are the following:

- The Internet can support teaching and learning when there is a need for information that is rapidly changing or difficult to obtain.
- The Internet can provide teachers and students with up-to-date material and data from all parts of the world.
- In collaborative projects, the Internet can provide students an opportunity to exchange ideas and work to solve problems with persons in other parts of the world.
- The Internet can provide students with examples of multiple and contending perspectives on issues and problems.
- The Internet can provide a means for teachers to communicate with one another and to exchange lesson plans and ideas.

In general education terms, the Internet can enable schools to offer broader curriculums, motivate students, help students learn to manage and handle large quantities of information, and foster mutual understanding across countries and cultures.

The Tools

Computer. Nearly any computer, IBM-compatible or Macintosh, can get you on to the Internet. However, to fully access the "bells and whistles" of the Internet, including graphics, sound, and video, an IBM-compatible computer with a 486 processor and at least 8 megs of Ram is needed. A Macintosh computer with at least a 68020 processor and 4 megs of Ram is needed. The much more powerful machines available increase overall Internet functionality. If this is the least bit confusing, talk with your technology teacher, co-workers who are already online, or a computer dealer.

Modem. A modem is a small piece of technology that connects to your computer and allows information to be sent and received by your machine. Modems can be installed within the computer or be connected externally. Modems are distinguished by their different "speeds" referred to as Baud, or bits per second. Modem speeds range from 1,200 baud to 54,600 baud. The higher the baud, the faster information can be sent or received. As is true with all information technologies, modem improvements are being made daily and baud rates will no doubt increase. To effectively access information on the Internet, a modem with at least 14,400 baud is recommended.

Phone Line. In most cases you will need an outside phone line. If you are connecting to the Internet from a home computer, you may share your home phone line with your computer. However, when you are online, you should know that (much like having a teenager in the house) callers will not be able to reach you and will receive a busy signal. In many schools and businesses, computers are hooked into the central phone system. If you wish to establish Internet access at your school, you are

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advised to check with your telephone company to determine what types of telephone equipment and lines will be needed.

Communications Software. One of two types of communication software is essential to access information or communicate via the Internet. Proprietary software is generally available on an installation disk from a commercial online service such as America Online or Compuserve. Once installed, the software provides access to the commercial server. Each commercial server then provides users access to the Internet. Serial Line Protocol (SLIP) and Point to Point Protocol (PPP) software allows users to access the Internet through an Internet service provider (ISP). These commercial providers are designed to link users directly to the Internet. This software is available commercially or may be downloaded for free from various Internet sites. Additionally, many Internet service providers will provide the software as part of their subscription service.

Internet Access Provider. As discussed above, two types of Internet providers dominate the Internet arena today. Commercial online services often provide free set-up disks, free trial periods, and unlimited service access for around $20 per month. America Online, Prodigy, and Compuserve are examples of commercial online services. If you sign on with one of these services, many information and communication options will be provided to you. Internet access is just one of the options.

An Internet service provider (ISP) gives the user direct access to the Internet and some communication services. An ISP is generally more powerful and faster than commercial online servers. If your primary interest is the Internet, then an ISP is probably your best choice. Costs are comparable to commercial online servers with unlimited access for about $20 per month. There are hundreds of ISPs throughout the nation. Many are local, many are national with a local access phone number. Check the business section of your local newspaper, your phone book, or computer/Internet publications for names of companies that provide this type of service.

The World Wide Web (WWW)/Web Browsers

The World Wide Web or Web is one component of the Internet and consists of client and server computers handling multimedia documents. Client computers (like yours and mine) use browser software—Netscape Navigator or Internet Explorer—to view documents or pages available from server computers. Server computers use server software to store documents for clients to access. Browser software is available commercially, is provided by commercial online servers as part of their service package, or is available for download on the Internet. Some form of browser is necessary in order to link up to the World Wide Web.

Going Online

At this point let's assume that you have the following Internet essentials: computer, modem, phone line, communications software, Internet provider, and browser software. Let's also assume that you feel ready to join the millions of people who connect to the Internet each day. Finally, let's assume that you are interested in the Internet as a resource for geography curriculum and instruction. What do you do first?

To begin, you instruct your computer to dial the phone number of your Internet service provider. This number will have been programmed through the communications or Internet provider software. The computer will dial the phone and your Internet provider will answer and connect you. Some servers will connect you directly to a web browser. Others do not, and once you are connected you have to click on your browser icon to activate your web browser. For example, I use a Macintosh computer. I connect to the Internet through Concentric, an ISP. Once I am connected to the server, I must click on my Netscape Navigator icon to activate the browser stored on my computer's hard drive.

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Once you have established an active web browser, the hard work is done and you are ready to explore. Again, however, there are several ways to conduct your journey. If you are just beginning, the best way is to search for information by way of a search engine. There are a number of search engines (Lycos, Alta Vista, Yahoo, Magellan, to name a few). Each provides information on protocols for conducting a search.

Let's now assume that you want to conduct a search on map making using Alta Vista. You can get to Alta Vista by (1) clicking on Bookmarks, (2) selecting the Best Site Links, (3) clicking on Search The Web, and (4) selecting Alta Vista (Netscape Navigator). You may also get to Alta Vista by selecting the Netsearch button on the Netscape Navigator browser, and then selecting Alta Vista. Once you arrive at Alta Vista, you can enter the words Map Making in the SEARCH box. Alta Vista will then provide you a list and short description of items in the data base relating to Map Making. You can scroll down through the list until you locate something that sounds appropriate to your needs. For example, I found an item identified as Map Making: The Ups and Downs. I clicked on it and it took me to Miller Middle School in Detroit, Michigan, and provided me with a lesson plan on map making.

As you continue your search, you will notice that each site or page has an address. The address or URL (Universal Resource Locator) is found in the Location box at the top of the browser (Netscape Navigator). If you know the address of a site, you can always type it in the Location box, hit return on your keyboard, and you will be whisked off to the site. For example, if you want to access the National Geographic Society, you can type the following address in the Location box: http://www.national-geographic.com/main.html. You can also store any site as a Bookmark in your browser. To recall a site from Bookmarks, simply pull down the menu, select the site by clicking on it, and the browser will immediately take you to the site.

It is now time for you to explore the Internet. However, before you depart, I must say a word about hot links. Often times the information provided on the Internet will have highlighted (often by underlining) text. These are hot links. By clicking on this text, the browser will take you to sites that explore the topic in greater detail or provide more specific information. For example, I visited the National Council for Geographic Education site (http://multimedia2.freac.fsu.edu/ncge/). The home page listed nine categories of information, one of which was publications. I clicked on publications and was provided a description of the NCGE publications program, including the *Journal of Geography*, which was highlighted in the text. I clicked on *Journal of Geography* and was provided information on the current issue and past issues. Each was highlighted. I clicked on June/July 1996 and was given a listing of articles appearing in that particular issue. Since each article was highlighted, I clicked on one and was provided with an abstract of that article. As you can see, by following the links, I was able to get from general publications to actual abstracts of journal articles.

Evaluating Internet Sites

Information posted on the Internet is, for the most part, unfiltered. Unlike most print resources such as magazines and books, there is little or no attempt to review and/or edit the material. Because anyone can put almost anything up on the Internet, we all need to be cautious about information we retrieve. To assist us in our caution, numerous guidelines and checklists for evaluating web sites have been developed. The following is a basic guide for evaluating Internet sites. As you begin to navigate the Internet, we strongly recommend that you employ these guidelines to ensure that the information you obtain is appropriate to your instructional goals.

- What is the purpose or intent of the site?
- What persons and/or organizations developed and maintain the site?
- Who wrote the information, and what point of view is presented?
- What is the quality of the content of the site?

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- Why is the information online?
- Does the text follow basic rules of grammar, literary composition, and spelling?
- Does the site provide links to other high quality sites?
- Is there any evidence of external evaluation of the site?
- Are the writing and currency of the materials appropriate to the site's intended purpose?
- How well does the site work?
- Does the site provide contact information for the author so that you can e-mail with questions or comments?

Some Sites to Explore

The following list of geography-related sites is included to help you get started on a geography site search. As you begin your exploration, you will soon discover that within cyberspace there is a vast array of information—some useful and good, some not. On some occasions your journey will end up nowhere. At other times, the stream of information will seem endless. Be patient and creative. There is much to learn and much that can be useful in learning.

Nice Geography Sites
http://www.frw.ruu.nl/nicegeo.html
Comprehensive index to hundreds of geography sites.

World Bank
http://www.worldbank.org/
Lots of data on economic development.

US Department of State
http://www.state.gov/Index.html
Comprehensive site focusing on international relations topics.

CIA World Factbook
http://www.odci.gov/cia/publications/nsolo/factbooks/global.htm
Country-specific information including data on geography, people, government, economy, transportation, communication, and defense.

US Census Bureau
http://www.census.gov
U.S. census data.

Mapquest
http://www.mapquest.com/
Interactive mapping site including an interactive world atlas.

Accurate Eye
http://www.accurate-eye.com.au/
Excellent extensive index of various type of data sources.

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The Great Globe Gallery
http://hum.amu.edu.pl
Many colorful projections and globe perspectives.

City Net
http://www.city.net/
Explore countries and cities throughout the world.

Vicinity Corp. MapBlast
http://www.mapblast.com
Find streets for almost any address in the U.S.

National Geographic Society
http://www.nationalgeographic.com/main.html
What more needs to be said?

National Council for Geographic Education
http://multimedia2.freac.fsu.edu/ncge/
Geographers' professional organization.

Virtual Tours
http://www.dreamscape.com/frankvad/museums.html
Links to online tours of historic sites, cities, museums, and more.

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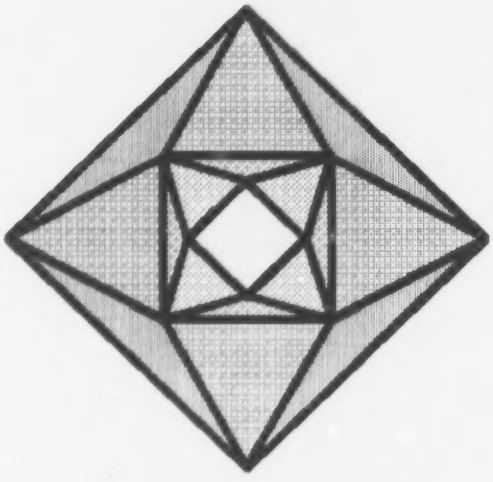
THE USES OF GEOGRAPHY



21. A Geography Wheel: Native Americans and the Land

Overview:

This lesson is designed to increase students' awareness of the diversity of the cultures present in North America prior to European settlement and to encourage them to consider geography's part in shaping that diversity. Through a group research project, students use geographic questions to explore the lifestyles of Native American groups in five regions of what is now the United States.

Objectives: At the end of this lesson, students will be able to:

1. Explain differences in Native American lifestyles in different regions of North America.
2. List several Native American groups that lived in five different regions of North America.
3. Use geographic questions to guide a research project.
4. Present research findings in an unfamiliar format: the geography wheel.

Standard Addressed: 5, 10, 17

Themes Addressed: Relationships within Places, Regions

Time Required: 4-5 class periods

Materials and Preparation: Make copies of Handouts 21-1 and 21-2 for all students. You may need to work with the librarian/media specialist to ensure that adequate resources on early Native American cultures are available for the student project. A large landform or climate map of the United States would be helpful.

Procedure:

1. Ask students what they think the population of North America was before European exploration. Allow several students to make guesses before telling the class that the population around 1500 is estimated to have been 2 million; those 2 million people spoke 300 different languages. What does this suggest about the cultures of the Native Americans? (They were quite diverse.)

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2. Distribute Handout 21-1 and go over it with the class. You might point out the five regions described on the handout on a landforms or climate map of North America to reinforce the information about the settings provided on the handout.

3. Divide the class into five groups, assigning each group one of the regions on the handout. Each group is to choose one Native American tribe from its region to research in greater detail. The questions listed on Handout 21-2 can be used to guide research, for which you should allow two to three class periods. Be available to answer questions and provide assistance while students are conducting their research.

4. Groups should share their completed geography wheels with the class. Conduct a concluding discussion focusing on cultural similarities and differences among the five groups researched. What role did the environment play in shaping culture? How did the people create ways of adapting to the environment?

Extension/Enrichment:

Students could create a large illustrated map showing what they learned about their groups. They might also create a "Visitor's Guide to Native American Heritage"; the October 1991 issue of *National Geographic* contained such a map, which shows the locations of Native American sites that can be visited to learn more about early American cultures.

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NATIVE AMERICANS IN THE 1400S

The many groups of Native Americans who lived across North America in the 1400s developed their own ways of living. Some of the differences in ways of living were related to the environment. Look for examples of differences as you read about Native American life in the five regions described below.

Arctic and Subarctic. Walruses, seals, and other sea mammals provided food for Native Americans in this region. In the cold winters, Native Americans lived in homes made of stone and driftwood covered with sod. In summer, they lived in animal-skin tents whose frames were made of wood or whale ribs. Among the tools they used were bows and arrows and canoes. Some of the groups that lived in this region were Aleuts and Kutchins.

The Far West. Seafood, land animals, and plant foods were plentiful in this region. The forests provided wood for building villages, many of which were quite large. In some parts of the region, shells were used in trade. Some of the groups that lived here were the Tlingit, the Tsimshian, the Haidi, the Kwakiutl, the Nootka, the Chinook, the Nez Perce, the Pomo, the Miwok, the Yokuts, and others.

Southwest. The Southwest was a very dry region. Techniques for farming in the region were learned from contacts with tribes in Mexico and Central America. Native Americans of the Southwest lived in pueblos, with thick stone or adobe walls to keep the interior cool during the day and warm at night. Tribes living in the Southwest included the Paiute, the Utes, the Shoshone, the Navajo, the Hope, the Zuni, the Pima, and the Papago.

Great Plains. The Great Plains had cold winters and hot summers. The region was one of the last settled by Native Americans, who moved there from the Eastern Woodlands. Early settlers in the region built permanent homes, where they farmed. The introduction of the horse by the Spanish changed the Indian way of life in the 1700s. Great Plains tribes included the Crow, the Mandan, the Dakota, the Cheyenne, the Pawnee, the Arapahoe, the Kiowa, the Wichita, and the Comanche.

Eastern Woodlands. Like the west, the eastern woodlands provided abundant fish, animal, and plant foods. However, the Native Americans in this region also became skilled farmers. They grew such crops as squash, gourds, and sunflowers. The forests provided woods for home-building; large settlements grew in some locations. Among the Native Americans of the eastern woodlands were the Iroquois, the Abnaki, the Pequot, the Delaware, the Powhatan, the Catawba, the Creek, the Choctaw, the Chickasaw, the Calusa, the Timucua, the Cherokee, the Miami, the Erie, the Winnebago, the Potawatomi, the Sauk and Fox, the Illinois, the Shawnee, and the Ojibwa.

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Creating a Geography Wheel

Geography and culture are often closely linked. Asking geographic questions about the Native American culture you are researching may help you discover valuable information about the culture. Use the questions below to help guide your research. Present your findings in the geography wheel on the next page.

Location:

- Where did this group live?

Place:

- Describe the place where your Native American group lived.
- What landforms were found in this place? What bodies of water?
- What was the climate like there?
- What kinds of things did Native Americans build in this place?
- How did Native Americans live in this place? What customs did they develop?

Relationships within Places:

- What natural resources did the Native American use?
- How did they get their food?
- How did Native Americans change the environment?
- What tools did Native Americans use to help them adapt to the environment?

Movement:

- Did your Native American group live in one place or move from place to place?
- Did the group have contact with other groups? If so, where did these groups live?
- Did your Native American group trade with others?
- Did your Native American group borrow ideas or technologies from other groups? Did other groups borrow ideas or technologies from them?

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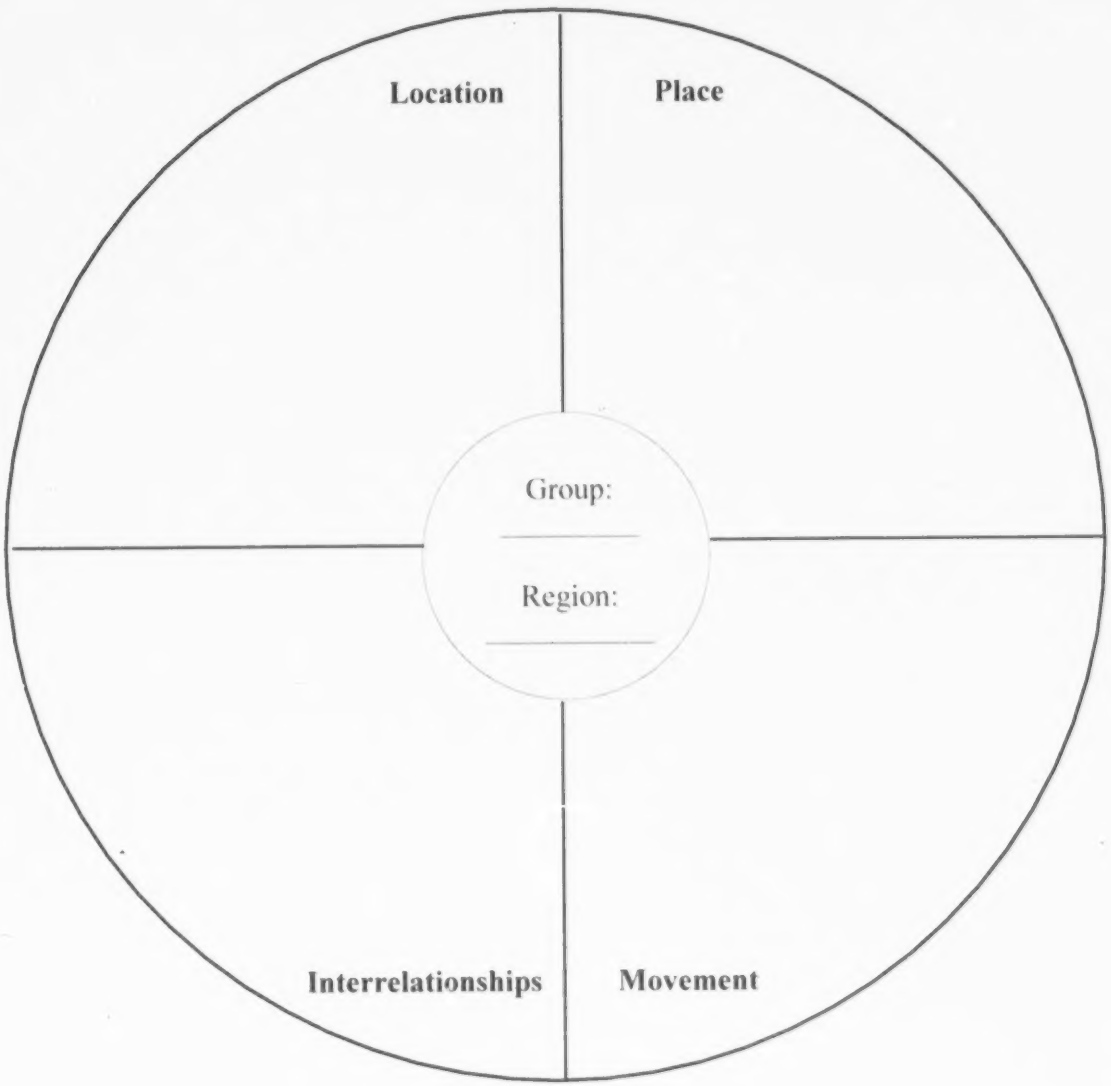

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22. New Drug Superhighway?

Overview:

This lesson provides an opportunity for high school students to explore the importance of a political region—the Central Asian Republics—and to relate their findings to a serious drug problem facing Europe and the United States. Through study of a news article and related map about the trade and processing of opium in Central Asia, students will gain understanding of the interaction of geographic, political, and economic forces in this region and insight into one of the most perplexing and frustrating problems facing governments today. This lesson could be integrated into courses in World History, Geography, Global Studies, Current Events, Government, and Economics.

Objectives: At the end of this lesson, students will be able to:

1. Identify the five Central Asian Republics.

2. Trace on a map the course of opium traffic from a prime source in Asia to markets in Europe, Russia, and the United States.

3. Understand the interaction of geographic, political, and economic forces in this region.

Standards Addressed: 1, 2, 3, 11, 13, 15, 16, **18**

Themes Addressed: Regions, Movement, Location, Relationships within Places

Time Required: 2-3 class periods plus homework

Materials and Preparation: You will need copies of Handouts 22-1, 22-2, and 22-3 for all students; transparencies of Overhead Masters 22-1 and 22-2; an overhead projector and overhead pens; colored pencils or markers; an atlas for each pair of students; and other reference materials depending on the time you wish to allocate for students to work in their small groups.

Procedure:

1. Have students brainstorm what they know about the type and origin of drugs in the world. (Responses may include references to marijuana, cocaine, heroin, opium, crack, LSD, and to Central and Latin America, as well as Asia.) Inform students that this lesson will focus on opium. Students may make reference to the Opium War of the mid-19th century, when Britain went to war to force the Chinese to accept imports of opium. Do they know what opium is made from? (The opium poppy) Student knowledge might be vague, so inform them that they will be seeing maps that will clarify the sources of some common drugs.

Developed by Patience Berkman, Newton Country Day School, Newton, Massachusetts

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2. Show Overhead Transparency 22-1. This map provides an excellent opportunity for group map reading and interpretation. Elicit from students the factual information they can gather from this map. (Four common types of narcotics grown in the Western Hemisphere, their places of origin, places and routes of shipment, places of destination) If students have not already mentioned Asia as a source of drugs, ask students if they know where else narcotic drugs originate.

3. Show students Overhead Transparency 22-2, which shows the Central Asian Republics. Point out which countries were formerly part of the Soviet Union. Also highlight Afghanistan, which was invaded by the Soviet Union in 1979. Explain to students that this region is another origin point for drugs. Locate the region on a world map to help students place it in its geographic context.

4. Distribute Handout 22-1 to pairs of students and tell them that they should add information to the map as you describe the production of drugs in the area. Explain (and draw these sites on the overhead map) that there are several opium-growing areas in the region; they are in the following locations:

- In southeastern Kazakhstan near the border with China.
- In south central Kazakhstan near the border with Uzbekistan (just east of the Aral Sea).
- On the border between Uzbekistan and Tajikistan.
- In eastern Tajikstan near the border with China.
- In southern Afghanistan. There are also several other smaller opium-producing fields scattered along the border between Afghanistan and Pakistan and another in southwestern Afghanistan near the border with Iran.

There are 12 known heroin labs in Afghanistan, located along the borders with Pakistan, Turkmenistan, and Tajikstan.

Osh, a city on the Silk Road in Kyrgyzstan, is a dispatch point for sending drugs to Russia, other parts of Asia, and Europe.

5. Next have students use colored pencils and an atlas or wall map to enhance their outline map with physical features (mountains, rivers, etc.), which they think would impact the growth or distribution of goods in this region. They should create a key that explains the colors and symbols they select. As a group, discuss the findings.

6. Ask students what they know about recent political developments in this part of the world. (You might ask if the date "1991" has any particular meaning as far as they know. The Central Asian Republics used to be part of the Soviet Union. Since 1991, they have been functioning as independent republics. Many have been experiencing serious political and religious strife.)

7. Distribute copies of Handout 22-2 to all students and explain that their assignment for the next class will be twofold:

- Answer the questions on the Student Response sheet that relate to the reading.
- Based on information in the reading, trace the movement of opium from its source to markets in Europe, Russia, and the United States on the world map.

8. At the beginning of the next class period, spend about 10 minutes discussing and expanding on student responses to the questions.

9. Explain to the class that they are going to take part in a Central Asia Summit Meeting. To prepare, each republic will convene a Drug Task Force to formulate recommendations for dealing with the drug problem in their own country.

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10. Divide the class into five groups, each representing a Drug Task Force within one of the five Central Asian Republics. Distribute Handout 22-3, which provides directions for the groups. Point out any resources you have gathered for student use. Note that guesswork will clearly be involved in formulating a budget, but it could lead to interesting discussion and governments certainly must assess costs.

11. Have a spokesperson for each group present their fact sheet and recommendations.

12. Have the group as a whole vote to accept or reject the recommendations.

Extension/Enrichment:

1. Have students respond to one of the following quotations for an additional assignment or as a topic of an in-class essay. You could give the topics out ahead and have them approach it as a mini-research assignment, requiring them to gather additional information from other sources in preparation.

- *"Geography, economy, and political chaos have rarely been joined in more perfect union."*
- *"One look at a map and you see it all."*
- *"Drugs are what works in this country. They solve every problem."*

2. Using the five themes retrieval chart (Handout 22-4), have students work in pairs to cull examples of each of the five themes of geography from the reading in Handout 22-2. They should record all responses on the retrieval chart with the most accurate responses.

3. Using news articles, students could research the political and religious conflicts that have arisen in the Central Asian Republics. Divide the class so that all five republics are covered, asking students to identify recent political and economic developments and the main causes of conflict in each of the republics.

Resources:

Agel, Jerome, George Demko, and E. Boe, *Why in the World: Adventures in Geography* (New York: Doubleday/Anchor books, 1992). This wonderfully informative and provocative book connects geographic themes to statistics on water, population, immigration, and economics, with frequent references to particular political situations. Fast-paced and light of tone, yet substantive. Some of the chapter titles are: "When Is a Nation Not a Country?," "Water Water...Well Not Everywhere: Conflicts in Making?," "5.3 Billion and Multiplying," and "In Search of the Once and Former Soviet Union."

Gilbard, Robert S., "Narcotics Control in Asia," *SIRS Researcher CD-ROM* (Boca Raton, FL: SIRS, updated yearly). This U.S. Department of State Dispatch (7/3/95) is an example of the rich resources available on the SIRS CD-ROM.

MacKay, Judith, *The State of Health Atlas: A Concise Survey of World Health through Full-Color International Maps* (New York: Simon and Schuster, 1993). Map 17 in this atlas, entitled "High Society," presents data on heroin, cocaine, and cannabis use on a world map. Map 16 presents alcohol use by country. Map 15 depicts statistics on cigarette smoking among men and women worldwide.

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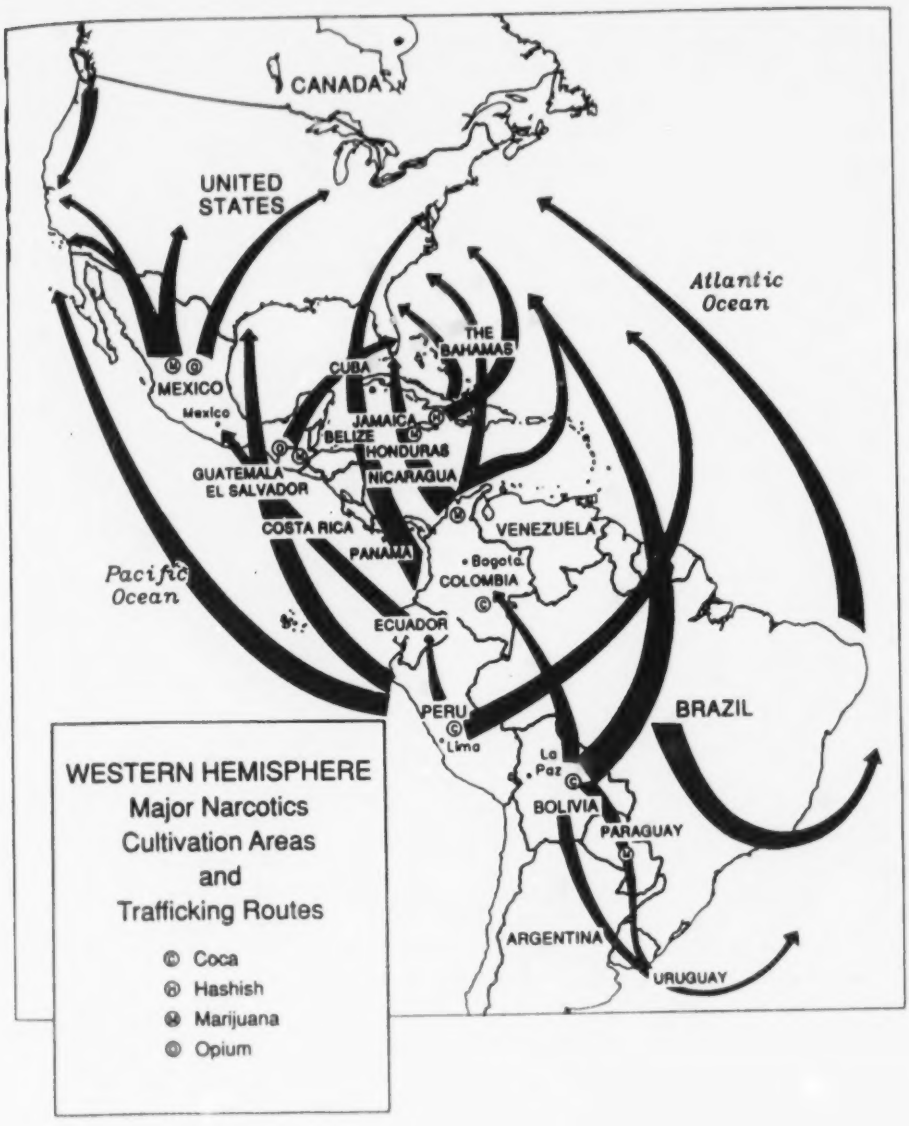

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CENTRAL ASIA

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NEW DRUG SUPERHIGHWAY

When the Soviet Union collapsed, many Americans rejoiced at the greater freedom that people there—and in other areas dominated by the Soviet regime—would enjoy. But the freedom has not been without costs. The greater ease with which people and products can move has led to an unfortunate side effect: the greater ease with which drugs can now be grown or manufactured and smuggled across borders (*Background Briefs* 1995). One result is a doubling in opium production worldwide since the breakup of the Soviet Union.

Much of the opium for sale in Europe is grown in what is called the "Golden Crescent"—parts of southern Afghanistan, northern Pakistan, and eastern Iran. Afghanistan has become the world's leading grower of illicit opium, which is that nation's most profitable crop. The increase in production results from the political and social strife in the country; lack of a strong central government has allowed opium to be cultivated and refined into heroin with little interference. In addition, crackdowns in Iran and Pakistan have slowed drug production there.

Because they have physical and climatic conditions favorable for growing poppies, just as Afghanistan does, the Central Asian Republics also have seen an increase of opium and heroin since the breakup of the Soviet Union. Because the countries also have mountainous terrain, it is easy for smugglers to work their way from country to country without detection. Consequently, many drugs grown and refined in Afghanistan find their way through the Central Asian Republics to markets on other continents. The governments of the Central Asian Republics do not have the money for the equipment and personnel they would need to keep track of traffic on the many mountain roads and passes on their nations' borders.

Osh, a city on the Silk Road in Kyrgystan, is believed to be the "best place in the world to buy opium" (Specter 1995). It is centrally located in the region, making it an excellent point for shipping heroin to other parts of the world.

The countries of Central Asia are poor. The average monthly salary in Kyrgystan is about $35; a boy smuggling drugs can earn twice that in just a few hours of work (Specter 1995). Unemployment is high, and has risen since the collapse of the Soviet Union. To many people, selling or smuggling drugs seems to be a good financial option. In addition, the money that can be made from drugs often corrupts police officers charged with enforcing drug laws. In the capital of Kyrgyzstan, police officers have been seen openly selling drugs. Border guards, who are paid for protection, conveniently take tea breaks when trucks carrying drug shipments reach the border. In contrast, truckers who do not have the money to pay bribes may be subjected to hours-long searches (Specter 1995).

Some of the Central Asian nations have very strict drug laws. Uzbekistan, for example, imposes the death penalty for selling drugs. Hardly anyone is ever caught, however.

Recently, the United Nations has taken action to try to break the flow of drugs in the region. They are working with the Taliban, the Islamic fundamentalists who control the province of Helmand, Afghanistan, known as the opium-growing capital of the world. Because

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drugs of any kind are against the religious beliefs of the Taliban, their leaders want to eliminate the drug trade as much as the United Nations does. The United Nations realizes, however, that Afghans need another economic activity to replace the role of opium in the economy. The cost of helping farmers convert to another crop is estimated to be $25 million per year for 10 years (Bonner 1997). This money will be used to repair irrigation systems that fell into disrepair during the war in Afghanistan, as well as to buy seeds, fertilizer, and equipment.

Because the Taliban, who will be key to the effort to wipe out opium poppies as a major crop, are militant fundamentalists, many American politicians do not want to put money into their hands. Thus, some analysts wonder if the United States will contribute its share to this United Nations effort.

Meanwhile, the production—and use—of heroin increase, as does drug-based crime.

References:

Background Brief: Trends in International Drug Trafficking (London: Foreign and Commonwealth Office, 1995).

Bonner, Raymond, "Joining with the Taliban in a New War on Drugs," *The New York Times* (November 20, 1997).

Specter, Michael, "Opium Finding Its Silk Road in the Chaos of Central Asia: Highway of Drugs," *The New York Times International* (May 2, 1995), pp. A1, A10.

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STUDENT RESPONSE SHEET

1. List the five countries of Central Asia.

2. What event in 1991 contributed to the political and economic instability of the region?

3. Which country is becoming the biggest grower of opium?

4. What physical characteristics of this region make it ideal for drug smuggling?

5. Describe the location of Osh. Why has this city become the "best place in the world to buy opium"?

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6. What are some of the harsh economic facts of this part of the world? What are some economic facts about the profitability of opium as it moves from market to market?

7. Trace the *movement of opium* from southern Kyrgyzstan to Europe.

8. What are the weaknesses in government law-enforcement agencies that have led to increases in opium growth and trade?

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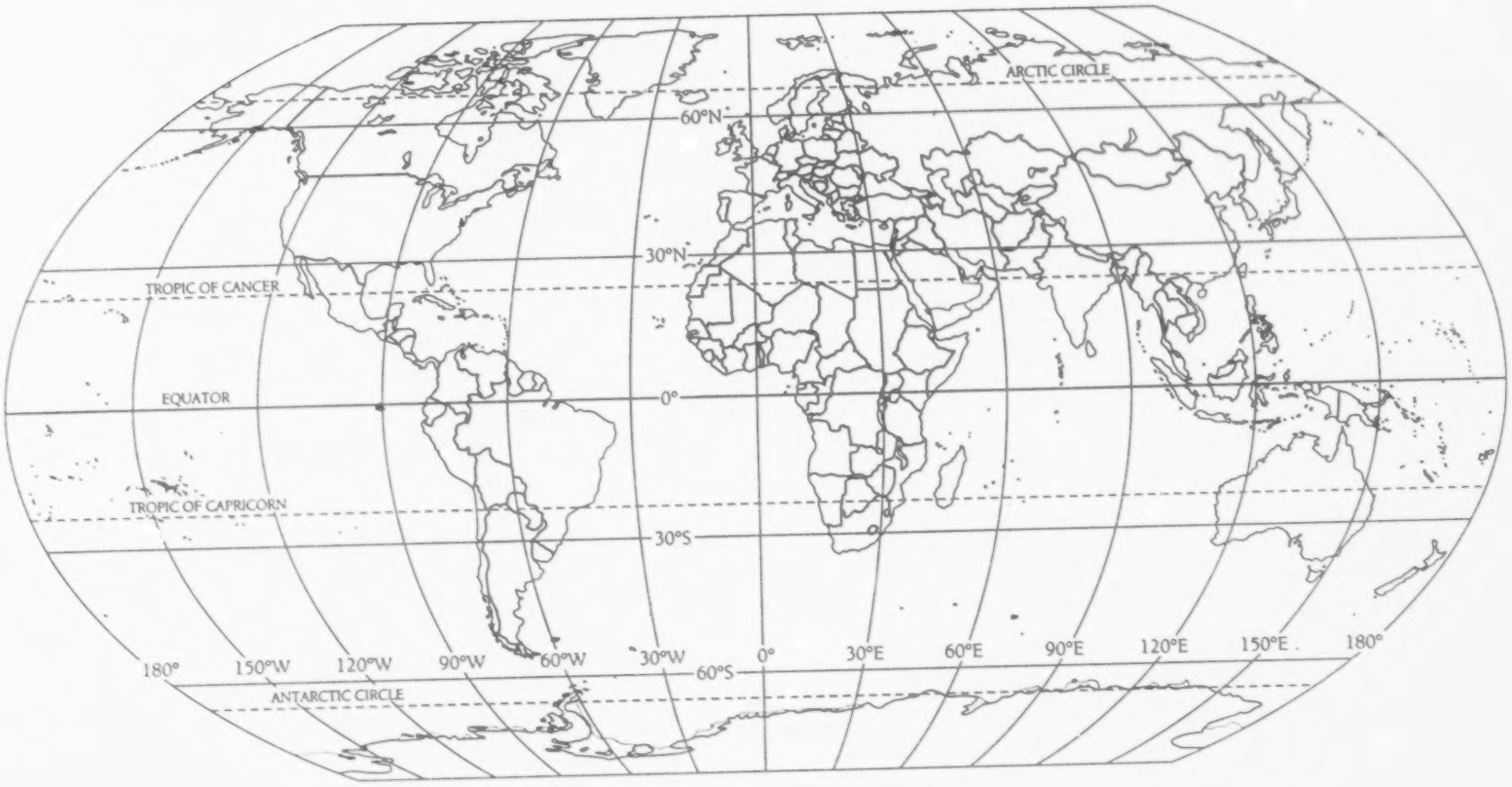

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DRUG TASK FORCE DIRECTIONS

Your group represents the Drug Task Force of _____. You have three tasks:

1. Formulate a fact sheet on the role of your country in the illicit growth, production, and transport of opium. Use the article and map and any other resources provided by your teacher to gather as many facts as possible.

2. Formulate recommendations to deal with the drug problem in your country. Develop an action plan tied to personnel needs and sites to be targeted. Budget the costs for such an operation.

3. Prepare a spokesperson to present your fact sheet and recommendations to the Central Asia Summit Meeting.

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FACT SHEET AND RECOMMENDATIONS

Name of Republic: _____

FACTS about involvement in opium production and trade:

RECOMMENDATIONS:

ACTION PLAN

PERSONNEL NEEDS

SITES TO BE TARGETED

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FIVE THEMES RETRIEVAL CHART

For the country you represented in the summit, fill in as much information on these five topics or themes as you can glean from the map and article.

	MAP	ARTICLE
LOCATION **Absolute/Relative**		
PLACE **Physical/Human Characteristics**		
HUMAN/ENVIRONMENT INTERACTION		
MOVEMENT		
REGION		

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Active Teaching: Service Learning

On a recent warm spring afternoon, 80 eighth-grade students from a middle school in suburban Denver gathered in a local park to erect bat houses. "Why bat houses?" a local reporter following the event asked.

"To control the mosquito population," one of the students answered. "Because of the water and foliage in the park, insects, particularly mosquitoes, are a problem. In our science class we have been studying ecosystems. We want to preserve the ecosystem of the park and at the same time make it usable to people in our community. We don't want the city to apply insecticides in the park so we are trying to encourage bats into the park. In class we learned that bats consume thousands of insects each day."

What Is Service Learning?

The bat house construction project is just one example of thousands of school-based service learning projects taking place throughout the nation. The National and Community Service Act of 1990 defines service learning as a method by which students learn through thoughtfully organized service experiences that meet actual community needs and are coordinated in collaboration with the school and community. Service learning is integrated into and enhances students' academic curriculum and provides structured time for students to reflect upon what they did during service activities. Service learning is not to be confused with school-based community service, which involves random or isolated acts of service performed by students. Service learning is the next generation of school-based service and enables young people to apply what is learned in classrooms to real-life community issues and problems.

If we look at the case of the bat house construction project, we can see these important elements come together. The science curriculum called for students to learn about ecosystems and the impact of human beings on ecosystems. In addition to classroom learning, teachers used the park as a community laboratory where students studied real ecosystems, as well as human and ecosystem relationships. The students, recognizing the importance of maintaining the park ecosystem and wanting to help make it a place that citizens could enjoy, worked with the city government. Students built the bat houses, and the city, instead of applying insecticides, helped install the bat houses in the park.

Benefits of Service Learning

School-based service learning can not only benefit students, it can also provide benefits to teachers, the school, and the community.

Service learning assists **students** to:

1. Develop a capacity for action.
2. Develop a sense of self-worth and self-assurance.
3. Develop citizenship skills and attitudes.

Developed by Ron Schukar, Social Science Education Consortium.

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4. Achieve intellectual development and academic learning.

5. Become socially responsible.

6. Become more motivated towards learning.

7. Gain a better understanding and appreciation of people with diverse backgrounds and life situations.

8. Increase knowledge of career opportunities in service-related fields.

9. Work to address real community issues and problems.

10. Develop an active sense of cooperation and collaboration for the purpose of solving real issues and problems.

11. Find relevance in classroom learning.

Service learning assists **teachers** to:

1. Broaden and deepen the curriculum to create a richer context for learning.

2. Gain new roles as mentors and guides as well as presenters of information.

3. Develop quality partnerships between students and themselves.

4. Use performance-based methods of evaluation.

5. Improve collegiality as staff work together in an interactive learning environment.

6. Develop mutually beneficial partnerships between themselves and the community.

Service learning assists the **school** to:

1. Address many key education reform issues.

2. Enhance school climate through the service ethic.

3. Assist in citizen and community development and enhance public relations.

Service learning assists the **community** to:

1. Achieve needed community development and renewal.

2. Benefit from direct aid, human involvement, and personal empowerment.

3. Receive an infusion of creativity and enthusiasm from young people.

4. Perceive young people as one of the community's greatest resources.

Principles of Service Learning

Several years ago, The Johnson Foundation sponsored a conference to determine the essential components of any school-based service learning program. The following 10 principles of good practice for combining service and learning were developed during the conference. These ten principles have guided many in the successful development and implementation of service-based projects in their schools and classrooms.

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1. An effective service learning program engages students in responsible and meaningful actions on behalf of the common good. Curriculum-enhanced service must meet real community needs or problems to be most effective.

2. An effective service learning program provides structured opportunities for students to reflect on their experience. Reflection is most useful when it is intentional and continuous throughout the experience.

3. An effective service learning program articulates clear curriculum and service goals for everyone involved. From the outset, everyone involved must understand what is to be learned and accomplished through the service-enhanced learning experience.

4. An effective service learning program allows those with needs to define the needs. Recipients of service must be provided opportunities to determine what service tasks are needed and how the tasks should be performed.

5. An effective service learning program clarifies the responsibilities of all persons and organizations involved.

6. An effective service learning program matches service providers and service needs through a process that recognizes changing circumstances. Effective programs must build in opportunities for continuous feedback about the changing service needs and growing service skills of those involved.

7. An effective service learning program expects genuine, active, and long-term organizational commitment. In schools, the most effective service learning programs are linked to the curriculum and require a commitment from the faculty and administration.

8. An effective service learning program includes training, supervision, monitoring, support, recognition, and evaluation to meet service and learning goals.

9. An effective service learning program insures that the time commitment for service and learning is flexible, appropriate, and in the best interest of all involved. The length of the experience and the amount of time required are determined by the service tasks involved and should be negotiated by all parties.

10. An effective program is committed to program participation by and with diverse populations. A good service learning program actively promotes access to the program by all students (Poulson 1989).

Geography and Service Learning

It is not by accident that within the social studies, service learning is most commonly linked with geography. As many geography teachers have discovered, service learning easily enhances geographic content. All that is really needed is some creativity, a little imagination, and a commitment to the process.

For the purposes of illustration, we have identified several grade 5-8 national geography standards and suggested service learning enhancements. It should be understood that these are only examples. Circumstances in every community determine what is and is not possible.

Geography Standard 1: The World in Spatial Terms

1.1 Students know and understand how to make and use maps, globes, graphs, charts, models, and databases to analyze spatial distributions and patterns.

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Service Activity Ideas: (A) Students work with city government to develop and disseminate a map of bike trails, or safe hiking trails within the community. (B) Students work with city traffic planners to chart traffic flow patterns in and around their school's neighborhood and make recommendations about how traffic flow patterns might be improved. (C) Students develop color-coded maps for the League of Women Voters or a local newspaper that depict voting tendencies in local voter precincts or districts.

Geography Standard 6: Places and Regions

6.1 Students know and understand how personal characteristics affect our perception of places and regions.

Service Activity Ideas: (A) Students organize a community forum that presents contending perspectives on a community land use issue. (B) Students gather and assess information about the use of places or regions in the community (e.g., a city park) from the view of various persons, and present their findings to community policymakers. (C) Students work with community and neighborhood leaders to develop local landmarks that support cultural identities found throughout the community.

Geography Standard 8: Physical Systems

8.4 Students know and understand how human activities influence changes in ecosystems.

Service Activity Ideas: (A) Students work with local governmental or non-governmental agencies to restore ecosystems in the community that have been seriously modified by human interaction. (B) Students identify flora and fauna along a hiking trail. Students develop and make available an information guide, including a section on taking care of the plants and animals, to citizens who use the trail. (C) Students develop a series of public service announcements for radio and television relating to the impact of human behavior and need to preserve community habitat.

Geography Standard 10: Human Systems

10.1 Students know and understand the spatial distribution of culture at different scales (local to global).

Service Learning Ideas: (A) Students plan and conduct a culture fair celebrating the community's various cultural groups. (B) Students work to teach English to residents of ethnic enclaves in a community. (C) Students plan and paint a mural representing the contributions of ethnic and cultural groups in the community.

Geography Standard 14: Environment and Society

14.1 Students know and understand the consequences of human modification of the physical environment.

Service Learning Ideas: (A) Students work with local industries to build and/or maintain wetland projects as a means to filter industrial-based waste water. (B) Students test local waterways and provide water test results to local agencies. (C) Students stencil storm drains to make the public aware of pollution potential. (D) Students paint out graffiti in local parks and community gathering places.

A more complete case study of a service-enhanced geography unit is presented on pages 202 to 204.

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Service Learning—It's Not for the Timid

When asked to describe the greatest challenges in planning and implementing a service learning project, most teachers will place time and logistical planning at the top of their lists. Planning and implementing a service learning project takes time. Because time is the scarcest of all resources for teachers, it is not surprising that it is an issue. However, like all new teaching strategies, service learning becomes easier with experience, and the amount of time required is reduced.

Logistical planning is related to time. Good service learning projects require a significant amount of planning. Community contacts must be made, transportation arranged, teacher colleagues and parents informed, volunteer chaperones recruited and trained, and so on. All of this must be done in concert with a full day of teaching and generally with little access to a telephone during the day.

Planning and implementing a service learning project requires a huge commitment from teachers. However, most teachers who have completed the process say that the benefits of service learning far outweigh the costs.

Recommended Reading and References

Cairn, Rich Willits, with James C. Kielsmeier, eds., *Growing Hope: A Sourcebook on Integrating Youth Service in the School Curriculum* (Roseville, MN: National Youth Leadership Council, 1991).

Poulson, Susan, ed., "Ten Principles of Effective Service Learning," *Wingspread Journal* (October 1989).

Schukar, Ron, Jacquelyn Johnson, and Laurel R. Singleton, *Service Learning in the Middle School Curriculum: A Resource Book* (Boulder, CO: Social Science Education Consortium, 1996).

"Service Learning," special section of *Phi Delta Kappan* (May 1996).

Wade, Rahima C., and David Warren Saxe, "Community Service-Learning in the Social Studies: Historical Roots, Empirical Evidence, Critical Issues," *Theory and Research in Social Education* (Fall 1996), pp. 331-359.

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WHERE'S WALDPORT? A CASE STUDY IN USING SERVICE TO ENHANCE GEOGRAPHY

Community Profile

Waldport is a small community located on the central coast of Oregon. Known for its beautiful ocean beaches, mild climate, and abundant wildlife, the community is rapidly developing into a tourist site. Approximately 1600 permanent residents live in the one-stoplight town. Historically, the major industries in the Waldport region were commercial fishing and logging. Both have declined as a result of strong environmental concerns.

As the economic base in Waldport has begun to change, so too have the demographics. With an emphasis on tourism, many families with small children and numerous retirees have moved into Waldport to open small businesses. As a result of its tourist marketing plan, Waldport has attracted more visitors. Although many just pass through, some return to become full-time residents.

Unit Background

During the summer of 1996, a team of teachers from Waldport Middle School attended a two-week service learning institute in Boulder, Colorado. The institute, *Integrating Service Learning Into Middle Level Education*, was conducted by staff of the Social Science Education Consortium under a contract from the Corporation for National Service - Learn and Serve America. During and after the institute, team members Bob Briggs, Tod Graham, Debbie Kilduff, and Janeen Kelly created an interdisciplinary, service-enhanced instructional unit titled "Where's Waldport?" The unit integrated several subject areas, including geography, at the sixth-grade level. The service component consisted of students' developing and providing a series of free information packets to new residents and visitors to Waldport. The information packets describe the environment, local services, and recreational opportunities in and around Waldport.

Unit Topic

The unit topic was selected to meet a real need in the community of Waldport and to teach the core academic content areas required for sixth-grade students at Waldport Middle School. As is true of most interdisciplinary teaching units, one discipline or subject area anchored the unit. In the example of "Where's Waldport?" geography was the central content area although many other subject areas (science, language arts, math, computer technology, communications, health, and art) were also integrated in the unit. Within the unit, each content area was supported with a clear set of instructional goals and activities. However, in light of the emphasis of this publication on active geography, only the geography goals and activities are included in the description.

Geography Goals

The following geography goals were established for the unit:

- Identify, define, and apply the five themes of geography.
- Describe where people, places, and features are located on the earth's surface.
- Understand the physical and human characteristics of place.

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- Understand the distribution and migration of human populations, ideas, and products.
- Understand how humans and the physical environment impact and influence each other.
- Understand and describe what makes up a region and how it changes.

Geography Activities

Emphasizing geography in a local context, students were involved in the following learning activities:

World Geography Review. In this lesson students created maps of the world, labeled place names on the map, and placed Waldport on the map. The goal of the lesson was to review general world geography and to compare and contrast Waldport's location to other locations in the world.

Introduction to the Five Themes of Geography. In this lesson students were provided a story and a list of questions for analysis. The goal of the activity was for students to develop a short description of the five themes of geography.

From the Classroom to the World. This lesson provided students an opportunity to review cardinal and intermediate directions and to use them to describe relative locations of objects in the classroom and on maps. The goal of the activity was for students to understand the impact of location on human activities in Waldport.

Identifying "Mystery" Places. This activity acquainted students with some of the physical and human characteristics that distinguish one place from another. The goal of the lesson was for students to understand characteristics of place and of Waldport.

Landforms and Geographic Terms. Students studied and reviewed types of landforms from a glossary of geographic terms. The goal of the activity was for students to be able to define and recognize different types of landforms and relate them to landforms in the Waldport region.

Sharing Our Global Environment. Students analyzed countries that contribute to and feel the effects of changes in our global environmental system. The goal of the activity was for students to understand the effects of humans on the environment in the Waldport area.

Movement. Students analyzed how movements of people and ideas have taken place throughout history. The goal of the activity was for students to understand why movement is taking place in Waldport and how that movement affects the community and environment.

Deserts, Mountains, Forests, and Grasslands. Students compared U.S. and world regions based on physical characteristics. The goal of the activity was for students to understand the physical characteristics of the region in and around Waldport in comparison to other regions of the world.

Waldport's Five Themes. Students defined and identified examples of the five themes of geography in and around Waldport. The goal of the activity was for students to apply the five themes of geography at the local level.

Service Goals

The service goals for the unit were to enable students to:

- Apply classroom learning of the five themes of geography as a lens from which to formulate a plan to help others understand the geographical uniqueness of the Waldport community.

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- Apply classroom learning and research as a source of information about the history, environment, local services, and recreational opportunities in the community of Waldport.
- Inform visitors and new residents of environment, services, and recreational opportunities in and around Waldport.
- Work with agencies and individuals in the community to meet a real community need.

Service Activities

With an understanding of Waldport as a location, place, and region, and understanding the geographic relationships within Waldport as well as the causes and consequences of movement in the area, students worked with community members and organizations to create a series of community information packets. Students interviewed area business owners and agency representatives and then wrote, published, and distributed the packets of information. One of the packets, *Oregon Coast: South Lincoln County*, contained a map of the region and "pull-out" sections on the following: Things To Do and See in Waldport, Bay and Estuary, Forest, Ocean and Beaches, Rivers, and Weather and Climate. Another section of the same brochure provided information on Day Use Parks, Service Organizations, Churches, and Schools. Another section outlined a short history and description of the economies of four small towns in the region.

Two other packets of information were also published and distributed: *Recreational Activities of South Lincoln County* and *Shopping in South Lincoln County*.

Evaluation

As a form of evaluation, community members were asked to reflect on how well students worked and interacted with others in the design and preparation of the information packets. In addition, students were required to keep and maintain a reflection journal related to the service component of the project.

Following the implementation of the project one business wrote the following: "_____ was a pleasure to work with. What a great opportunity to learn about our community and how a business functions.

_____ made appointments with me before she visited. She was always on time and prepared with many questions. She carried herself in a professional manner.

I appreciate the opportunity to help our community and will be happy to help in the future."

Another community member provided the following: "Thank you for allowing our company to participate in your service learning project. We had the pleasure of being interviewed by a very prepared young man by the name of _____. He presented himself well, he seemed very confident in his material. We were very impressed with his hand shake, eye contact, and politeness. We hope that you continue this very worthwhile project. This is a great way to bridge the gap between school and community. If _____ is an example of what the public schools are doing today, especially Waldport Middle School, then you should be very proud."

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Model Unit

The Colorado River Basin—Past, Present, and Future

Unit Overview:

In this four-lesson unit, students explore the creation of a desert civilization in the American West, a civilization that depends on the Colorado River for its survival. The first lesson, "The Colorado River Basin Region," introduces students to the region. Students create a large wall map of the region, which they will refer to and adapt throughout the unit. In the second lesson, "Dividing the Colorado River," students discover the historic competition among Colorado River Basin states over use of the river's water. Students examine how the states divided the river's water in the 1922 Colorado River Compact and identify flaws in the compact.

The third lesson looks at "Las Vegas and the Colorado River." Las Vegas, Nevada, is the nation's fastest-growing metropolitan area. The city's boom in the 1990s, based on casino-building and on the growth of non-gaming industries in the area, is made possible by Colorado River water. In this lesson, students explore Las Vegas as a case study of desert civilizations' dependence on human-engineered water sources for their survival.

To culminate the unit, students explore the impact of growth in the Colorado River Basin on the river itself in a lesson entitled "The Colorado River and the Future." Students work in small groups to learn about various issues affecting the river and work together to find a regional solution to water use in the Colorado River Basin.

For teachers who might wish to coordinate a novel study with the unit, a study guide for the young adult novel *Downriver*, by Will Hobbs (New York: Atheneum, 1991), is provided at the end of the unit.

Standards Addressed: 1, 5, 12, 13, 14, 16, 17, 18

Themes Addressed: Location, Relationships within Places, Movement, Regions

Time Required: 6-9 class periods

Supplemental Resources:

Carrier, Jim, "The Colorado: A River Drained Dry," *National Geographic* (June 1991), pp. 4-34.

Developed by Sara Thompson, Flagstaff Arts and Leadership Academy, Flagstaff, Arizona.

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Carrier, Jim. *Down the Colorado: Travels on a Western Waterway* (Denver: Roberts Rinehart, 1989).

Collier, Michael, Robert Webb, and John Schmidt, *Dams and Rivers: Primer on the Downstream Effects of Dams* (Tucson: U.S. Geological Survey, 1996).

Davis, Margaret Lewis, *Rivers in the Desert: William Mulholland and the Inventing of Los Angeles* (New York: HarperCollins, 1993).

Fradkin, Philip L., *A River No More: The Colorado River and the West* (Tucson: University of Arizona Press, 1981).

Fraser, Mary Ann, *In Search of the Grand Canyon: Down the Colorado River with John Wesley Powell* (New York: Holt, 1995).

Gavin, Jennifer, and Adriel Bettelheim, "Western Water Showdown," *The Denver Post* (September 18, 1994), p. 1A.

Newcott, William R., "Believing Las Vegas," *National Geographic* (December 1996), pp. 58-81.

Reisner, Marc, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin Books, 1986, updated 1993). A PBS series based on this book was broadcast in 1997. Contact your local PBS station for availability information.

Stevens, Larry, *The Colorado River in Grand Canyon* (Flagstaff, AZ: Red Lake Books, 1986).

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1: The Colorado River Basin Region

Overview:

This lesson introduces students to the Colorado River Basin Region. Students create a large wall map of the region, which they will refer to and adapt throughout the unit.

Objectives: At the end of this lesson, students will be able to:

1. Define a river basin.
2. Identify Colorado River basin states and tributaries of the Colorado River.
3. Find and label geographic features of the river basin on a large wall map.

Standards Addressed: 1, 5

Themes Addressed: Location, Regions

Time Required: 1-2 class periods

Materials and Preparation: Make a blank wall map of the Colorado River Basin Region, using the map in Handout B to create a transparency, then transferring the image to large butcher paper. You will also need to make copies of Handouts A and B for all students. Other needed materials include markers, detailed map(s) of the Colorado River Basin area, and student atlases.

You may also want to display pictures/photographs of the Colorado River Basin region in the classroom. The *National Geographic* magazines listed in supplementary resources are good sources; your school library may have picture books about the Grand Canyon, Arizona, southern Utah, and other areas in the region.

Procedure:

1. Begin the lesson by asking students what they know about the Grand Canyon. What river flows through it? How was it formed? Where is it located? (Students may be able to identify the Colorado River as the water that flows through, and cut, the dramatic canyon in what is now Northern Arizona.) Ask if anyone in the class has visited the canyon. If so, ask the student(s) to describe it, along with the climate and what the area looks like. Were they able to see the river a mile below the canyon rim?

2. Tell students that the Colorado River is responsible for creating much of the dramatic scenery in America's Southwest, including the Grand Canyon. Today, the river is also responsible for keeping the desert civilization of the Southwest alive, by irrigating farm and ranch lands and by providing drinking water and hydroelectric power for cities such as Phoenix and Las Vegas. The Colorado River links the areas it flows through into a region called the Colorado River Basin. Inform students that they will

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spend the next class period(s) learning about the region the Colorado River flows through and its dependence on the river.

3. Distribute Handout A to each student. Direct students to read the handout, then check for student understanding through a discussion, using the questions at the end of the reading as a starting point.

4. Arrange students in groups of four and distribute Handout B, along with an atlas, to each group. Ask students to work with their group to find and label the listed items on their map of the Colorado River Basin.

5. When students have completed their map assignment, check student work for accuracy. Then assign each group items from the handout list to label on the large wall map of the Colorado River Basin. (Group A might label tributaries, Group B might label the river basin states and Mexico, and so on.) You may ask students to use colored markers so that the labels are visible for future lessons about the river basin.

6. When students have completed their labeling tasks, have them find Los Angeles, Las Vegas, and Tucson on the wall map. Ask students how these cities might make use of Colorado River water, even though they are not all close to the river. After students have brainstormed possible explanations, tell them they will return to this question in another lesson about the river basin.

7. If you are coordinating a novel study with this unit, introduce the novel *Downriver* and have students begin reading it. A guide for discussing the novel is provided at the end of this unit.

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THE COLORADO RIVER BASIN

The Colorado River flows through, and created, some of the most beautiful scenery in the world. Each year, millions of tourists from all over the world visit the Grand Canyon, which was cut by the steady flow of the Colorado River over millions of years. Today, the Colorado River Basin includes much more than fantastic scenery: it is home for millions of Americans in fast-growing cities such as Phoenix, Tucson, and Las Vegas; it also supports crop land and cattle grazing over a large segment of the American West. Throughout the Colorado River Basin, water-thirsty cities and states wrangle with each other along every mile of the river about who owns the rights to Colorado River water.

What is a river basin? A river basin is the area that a river, and all its tributaries (streams that flow into the river), drain. The Colorado River Basin is a vast area, covering 244,000 square miles. Rivers and streams from seven western states flow into the Colorado River; these states make up the Colorado River Basin states. They are Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, and California. The basin also includes 2,000 square miles of Mexico, where the river flows into the Gulf of California.

The Colorado River Basin area is a region of geological contrasts. The Colorado River begins its flow in the almost 13,000-foot high peaks of Rocky Mountain National Park in Northern Colorado. Its greatest tributary, the Green River, flows out of Wyoming's Wind River Range. The Green River joins the Colorado in Utah's dramatic Canyonlands, in the high desert, red-rock country north of the Grand Canyon. Glen Canyon Dam, 90 miles upstream from the Grand Canyon, controls the flow of the Colorado through the Grand Canyon; Hoover Dam backs up the Colorado into a lake east of Las Vegas. The remaining miles of the river's controlled flow wind south through searing low deserts along the borders of Nevada, Arizona, and California to the Gulf of California, where the Colorado trickles into the ocean. Along its 1,450-mile journey, the river has dropped nearly 13,000 feet in elevation and traveled from icy mountain lakes to the shimmering sands of the Gulf of California.

Questions for Discussion

1. Define a river basin. What river basin is your town located in? (You may need to look at a map to answer this question.)

2. Why do you think people who live in Colorado River Basin states disagree about how the Colorado River's water is used? Do you think the region's climate might be a factor in the disagreement? Explain.

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MAPPING THE COLORADO RIVER BASIN

1. On the map provided, find and label the following items:

   Colorado River
   Green River
   San Juan River
   Gila River
   Seven Colorado River Basin states (Colorado, Wyoming, Utah, New Mexico, Arizona, Nevada, California)
   Mexico
   Grand Canyon
   Glen Canyon Dam
   Hoover Dam
   Lake Powell
   Lake Mead
   San Juan River
   Gulf of California
   Phoenix, Arizona
   Tucson, Arizona
   Los Angeles, California
   Las Vegas, Nevada
   Little Colorado River
   Gila River
   Rocky Mountains
   Mojave Desert
   Great Salt Lake Desert
   Painted Desert
   Altar Desert

2. When you have completed your mapping, decide as a group on a generalization you can make about the Colorado River Basin region based on the map and the reading you have done.

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Colorado River Basin

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2: Dividing the Colorado River

Overview:

In this lesson, students discover the historic competition among Colorado River Basin states over use of the river's water. Students examine how the states divided the river's water in the 1922 Colorado River Compact and identify flaws in the compact.

Objectives: At the end of this lesson, students will be able to:

1. Brainstorm possible ways to divide a river among competing states.

2. Explain how the Colorado River Compact divided the river's water among the seven basin states.

3. Identify flaws in the Colorado River Compact of 1922.

Standards Addressed: 13

Themes Addressed: Relationships within Places, Regions

Time Required: 1-2 class periods

Materials and Preparation: You will need the student-created wall map of the Colorado River Basin region; markers; atlases; copies of Handouts C and D for all students; overhead projector or chalkboard.

Procedure:

1. Begin the lesson by asking students to recall what they learned about the Colorado River Basin in the previous lesson. What is a river basin? What are some of the physical features of the Colorado River Basin?

2. Tell students that in this lesson they will learn about the Colorado River Compact, a 1922 law that divides the river's water among the seven river basin states. Ask students to think of reasons such a law was needed and how it would be possible to divide a river's water. Ask students to brainstorm their answers to these questions; record student ideas using an overhead projector or chalkboard.

3. Distribute Handout C to all students. Ask students to read the handout; when they have finished reading, ask students to form small groups to discuss the questions at the end of the reading. Once students have had time to develop ideas, ask them to share their ideas in a class discussion. In discussing question 3, if students find it difficult to think of ways a state could maintain control of their allotment of the river's water, ask them to look at the large wall map of the river basin. What methods for controlling the river do they see on the map? (Students should note the dams along the river.) Ask

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students how they think the dams would help states maintain control over their share of the river's water.

4. Distribute Handout D to all students. When students have finished reading, ask several students to label each state's (and Mexico's) Colorado River Compact water allotment (acre-feet per year) on the large wall map of the river basin, so that each state's allotment appears within its borders.

5. Ask students to describe how the Colorado River Compact of 1922 divided the river's water among the seven basin states. How does it compare to student-generated ideas in step 2 of this lesson? Do students think the river compact divided the water fairly? Why or why not? Ask students to list problems with the compact that are identified in the reading. Can they think of any other potential problems raised by the 1922 river compact? Inform students that in the next lesson, they will examine problems with the compact by focusing on one city's dependence on the river's water.

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THE COLORADO RIVER COMPACT

The Colorado River flows through an arid region, with an average rainfall of only 10 inches per year. The seven Colorado River basin states—Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada, and California—are all dependent on the river's water. In the early part of the 20th century, the Colorado River basin states depended on the river mainly to water crops and cattle-grazing land; at the end of the 20th century, the river's water is still used by agriculture, but also by fast-growing cities such as Las Vegas, Phoenix, and Los Angeles. These cities rely on the river for such uses as drinking water, filling swimming pools, and watering lawns; they also depend on the hydroelectric power produced at dams along the river to meet their air conditioning, lighting, and other electricity needs.

In the late 1890s, growing Southern California cities and farms required increased amounts of the Colorado River. They developed pipelines and other schemes for diverting water from the main river channel. Because the other Colorado River basin states were growing much more slowly than California, their reliance on the river's water was not as great. Those states were content to let California use the water it needed.

By the early 1920s, however, southern California agricultural interests sought more and more Colorado River water to irrigate the giant farms in California's Imperial Valley. The other six river basin states began to view California's voracious appetite for Colorado River water with alarm. If California diverted the main flow of the river for its own use, the other states would be left without control of the river's water. These states recognized the need for laws to govern the use of the river, to assure a water supply for each of the Colorado River basin states for the future. It was time to legally divide up the river's water fairly among the seven states, they believed, before California ended up controlling the majority of the river's water.

In 1922, representatives from the seven basin states met to design an interstate compact dividing the Colorado River water among the seven states. The result was the 1922 Colorado River Compact, which divided the river in half at Lee's Ferry, Arizona. If a state's waters drained into the river above Lee's Ferry, it was an upper-basin state; if its waters drained into the river below Lee's Ferry, it was a lower-basin state.

Questions for Discussion

1. Find Lee's Ferry, Arizona, on a map. Based on what you know of the Colorado River Compact, which states are upper basin states? Which states are lower basin states?

2. How do you think the Colorado River Compact divided up the river's water? Do you think the compact guaranteed each state an equal share of the river's water? Why or why not?

3. How do you think each state could maintain control over the water it was allotted? How could an upper basin state guarantee that water allocated to it would not flow downstream to California after all?

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DIVIDING THE COLORADO RIVER

The 1922 Colorado River Compact divided the river's water equally between the upper and lower basin states. The upper basin includes Wyoming, Colorado, Utah, and New Mexico; the lower basin is made up of Arizona, Nevada, and California. How did the writers of the compact determine the amount of water that each basin would receive?

River water is measured in a unit known as "acre-feet." One acre-foot of water equals the amount of water it takes to cover one acre of land evenly with one foot of standing water. One acre-foot of water is roughly 326,000 gallons, or enough water to meet the needs of a family of four for one year.

The river compact stated that each basin would be allotted 7.5 million acre-feet of Colorado River water per year. The writers of the compact based this amount of water on records kept of the river's flow from 1896-1921. During that period, the river's annual flow averaged 16.8 million acre-feet, as measured at Lee's Ferry. So, with 15 million acre-feet per year divided in half between the two basins, there should still be surplus water remaining in the river.

The compact divided each basin's allotment of water among its states, with each state getting a different share of the river. The amount each state received was based on the state's estimated future demand for the water. California, for example, got 4.4 million acre-feet of water per year, while Colorado was allotted 3.8 million acre-feet. Nevada, a state with a very low population in 1922, was allotted a tiny fraction of the water—only 300,000 acre-feet per year. In 1922, no one imagined that Nevada's harsh, dry land could support agriculture or cattle, let alone large cities.

Colorado River Compact Allotments by State

UPPER BASIN

Colorado	3.8 million acre-feet/year
Wyoming	1 million acre-feet/year
Utah	1.7 million acre-feet/year
New Mexico	800,000 acre-feet/year

Upper Basin total: 7.5 million acre-feet/year

LOWER BASIN

Arizona	2.8 million acre-feet/year
Nevada	300,000 acre-feet/year
California	4.4 million acre-feet/year

Lower Basin total: 7.5 million acre-feet/year

Problems with the compact began almost the minute it was signed. One problem involved Mexico. The compact allowed the seven river basin states to use almost the entire flow of the

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Colorado River; as a result of irrigation, damming, and diversion of water out of the river channel, the river nearly ceased flowing into the Gulf of California, its outlet to the sea. Mexicans had always depended on the Colorado River's flow for their own needs—and now demanded a treaty that would guarantee a continued flow of the river into Mexico. In 1944, the United States agreed to deliver 1.5 million acre-feet of Colorado River water to Mexico each year.

Another problem with the compact concerned the amount of water that actually flowed through the Colorado. From 1922 to 1976, the river's flow averaged far below the 16.8 million acre-feet per year that had been recorded between 1896 and 1921. Between 1922 and 1976 the river's flow averaged only 13.9 million acre-feet per year; from 1931 to 1940, the average flow was only 11.8 million acre-feet per year. The river compact of 1922 was based on the amount of water that flowed through the river during an especially high precipitation period. During years of lower precipitation, the total amount of water allowed to both basins in the compact was higher than the actual amount of water that flowed in the river. The compact was based on faulty estimates of the river's flow.

As long as the Colorado River basin states didn't use their entire share of the water, this flaw in the compact didn't present a problem. But as the population in those states increased, with the explosive growth of desert cities such as Las Vegas and Phoenix, each state came closer to using its full share of the river. The river basin states began to argue once again about use of the river.

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3: Las Vegas and the Colorado River

Overview:

Las Vegas, Nevada, is the nation's fastest-growing metropolitan area. The city's boom in the 1990s, based on casino-building and on the growth of non-gaming industries, was made possible by Colorado River water. In this lesson, students explore Las Vegas as a case study of desert civilizations dependent on human-engineered water sources for their survival.

Objectives: At the end of this lesson, students will be able to:

1. Describe the historical development of Las Vegas.
2. Explain Las Vegas's dependence on the Colorado River.
3. Develop a water use proposal for the city of Las Vegas.

Standards Addressed: 12, 14

Themes Addressed: Relationships within Places, Movement

Time Required: 2 class periods

Materials and Preparation: You will need the student-created wall map of the Colorado River Basin region, as well as copies of Handout E for all students.

Procedure:

1. Begin the lesson by having students look at the wall map of the Colorado River Basin. Ask students to locate the dams (Glen Canyon and Hoover) at each end of the Grand Canyon and the lakes (Lake Powell and Lake Mead) that the dams created. Allow students to brainstorm and discuss their answers to these questions:

- Who might have wanted to build these dams on the Colorado River?
- How might the dams be related to the Colorado River Compact, and arguments among the states?
- What do you think the purposes of the dams are?

2. Tell students that in 1857 U.S. Army Lieutenant Joseph Ives, a mapping engineer, traveled to the dry desert area near where Las Vegas, Nevada, is located today. In his journal, he described the area as follows:

> The region...is, of course, altogether valueless....Ours has been the first, and will undoubtedly be the last, party of whites to visit the locality. It seems intended by

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> nature that the Colorado River, along the greater portion of its lonely and majestic way, shall be forever unvisited and undisturbed (quoted in Newcott 1996, p. 65).

Then ask students what image of the area near Las Vegas, Nevada, Lt. Ives's description evokes. Ask students to describe what the area must have looked like when Lt. Ives visited it.

3. Ask students to find Las Vegas, Nevada, on the wall map of the Colorado River Basin. Discuss with students what resources they think it would take to turn this "valueless" area into a booming metropolis. Record student answers.

4. Distribute Handout E for all students to read. After students have completed the reading, assemble students into groups of four. Ask each group to work together to solve the following problem:

> In 2006, your group (the Las Vegas Valley Water Board) has been required by Nevada's governor to design a new plan for water use in Las Vegas. The governor is especially worried that the state will soon be using its full share (300,000 acre-feet per year) of Colorado River water and wants Las Vegas to cut back its use of the river's water. Meanwhile, leaders of the casino gambling industry have warned you that cutting back the flow of Colorado River water to Las Vegas will mean a slowed economy and loss of jobs for Las Vegas residents.
>
> How will you respond to the governor's demand? Can the Water Board balance the governor's requirement to live up to the 1922 Colorado River Compact with the desire for economic growth in Las Vegas? Develop a proposal that you think will satisfy the governor and the casino industry in Las Vegas.

5. Allow students sufficient time to discuss the issue with their group and to design a proposal. Allow each group to share its proposal with the class.

6. As a class, discuss the merits of each proposal. Are the solutions plausible? Does the class believe it is possible to achieve a balance between the 1922 River Compact and continued economic growth in Las Vegas? Have students explain their positions.

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THE GROWTH OF LAS VEGAS

A Natural Oasis

U.S. Army Lieutenant Joseph Ives did not live to see the spectacular growth of a town called Las Vegas in the Nevada desert just west of the Grand Canyon. Far from being valueless, Las Vegas boasts a thriving economy based on casino gambling; the city's survival is dependent on water from the Colorado River.

Las Vegas began its life, however, as a natural desert oasis. In the early 1800s, migrants traveling along the Old Spanish Trail from the Great Salt Lake to California found Paiute Indians living in the shade of tall grasses and mesquite and cottonwood trees. The oasis was fed by spring water. The migrants named the site Las Vegas, meaning "the meadows."

In 1905, the Union Pacific Railroad extended its line through Las Vegas. Five years later, the dusty railroad town had 945 residents. Those residents began to look for a dependable water supply to allow the town to grow. After the Colorado River Compact was signed in 1922, Las Vegas, along with southern California interests, began to promote the idea of a giant dam on the Colorado River, just below the Grand Canyon. The dam would create a storage site for water for the lower basin states. The dam would also produce hydroelectric power. In December 1928, the U.S. Congress and President Coolidge signed the Boulder Canyon Project Act, which allowed construction of such a dam.

The Dam Project

The dam project, first called Boulder Dam and later renamed Hoover Dam, began in 1931. (That same year, Nevada legalized gambling.) The project was an epic engineering and construction feat. Five thousand workers, eager for the chance to work during those deep Depression years, moved to Las Vegas to build the dam. During its construction, summer temperatures soared as high as 152 degrees Fahrenheit at the construction site; 110 men died during the building of the dam. The finished dam, a curving, white concrete structure set against dramatic black canyon walls, plugged and controlled the flow of the Colorado River below it. Behind the dam, a reservoir named Lake Mead extended for 108 miles. For many Americans, the successful completion of this colossal project in 1935 renewed their belief in America's strength and vitality. To residents of Las Vegas and Southern California, Hoover Dam represented enormous economic possibilities.

Hoover Dam enabled Las Vegas to grow from a sleepy railroad town into a thriving city. In the 1940s, the infamous Bugsy Siegel built his Flamingo Hotel, initiating the first wave of casino building in Las Vegas. The arrival of the billionaire, Howard Hughes, to the desert community in 1966 touched off the second great casino-building boom. The 1990s have seen a third great wave of casino construction, which shows no signs of stopping. The natural desert oasis supporting cottonwood and mesquite trees was transformed by water piped from Lake Mead into a bustling city of more than a million people. The city's casinos, fountains,

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golf courses, green lawns, neon lights, and very existence depend on the water of the Colorado River. It has become an artificial desert oasis.

Consequences of Growth

Today, Las Vegas is America's fastest-growing urban area. Each year, 75,000 new residents come to Las Vegas. In 1994, Las Vegas's population reached one million; by 2005, Las Vegas is projected to have two million residents. The current population boom is fueled by the construction of new casinos, each one bigger and more elaborate than the last, and by new, non-gaming industries moving into the Las Vegas area.

Las Vegas is not the only city in America's arid Southwest that depends on the Colorado River. Cities throughout the river basin rely on the Colorado River's water and hydroelectric power. Phoenix and Tucson could not exist at their current levels of population without water piped across the desert from the Colorado River. The bright lights and air-conditioned skyscrapers of Los Angeles, far from the river, are possible because of the hydroelectric power produced at Hoover Dam and other dams along the river.

The spectacular growth experienced by Las Vegas in the past decade, however, focuses the West's attention on the Colorado River Compact once again. In 2008, Nevada will reach its full use of the 300,000 acre-feet of river water promised to the state in the 1922 compact. What will happen then? Without more water, Nevada won't be able to sustain its growth rate.

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4: The Colorado River and the Future

Overview:

In this lesson, students explore the impact of growth in the Colorado River Basin on the river itself. Students work in small groups to learn about various issues affecting the river and work together to find a regional solution to water use in the Colorado River Basin. The culminating activity in this lesson can serve as an assessment for the entire unit.

Objectives: At the end of this lesson, students will be able to:

1. Describe costs and benefits of dams along the Colorado River.
2. Explain environmental consequences of human-caused changes to the Colorado River.
3. Develop a regional solution for water problems in the Colorado River Basin.

Standards Addressed: 14, 16, 17, 18

Themes Addressed: Relationships within Places, Regions

Time Required: 2-3 class periods

Materials and Preparation: You will need the student-created wall map of the Colorado River Basin region; enough copies of Handouts F and G for half the class and enough copies of Handouts H and I for the entire class; overhead projector; chalkboard.

Procedure:

1. Begin the lesson by asking students to recall the creation of Hoover Dam in the 1930s. Why were Las Vegas residents eager for the dam to be built? How did the city of Las Vegas benefit from the dam?

2. Tell students they will spend the next several minutes learning about costs and benefits of dams along the Colorado River. Have students form pairs. Distribute one copy each of Handouts F and G to each pair of students. Distribute Handout H to all students.

3. Direct students to read either Handout F or G, and then to teach their partner what they learned about dams on the Colorado River. Once both partners have shared their readings, ask all students to record costs and benefits of dams in Handout H.

4. As a class, discuss the costs and benefits of dams. Inform students that once dams are built, it is usually not realistic or possible to remove them. Instead, our society has become less interested in building new dams and more concerned about how to best use the ones we have, and to maintain or improve the environment above and below dams. Scientists who have studied the downstream effects

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of dams along the Colorado River have proposed ways to preserve plant and animal habitat along the river.

5. Now that students have learned about the Colorado River's historic flow and human uses and control of the river, ask students how they would describe the Colorado River. Direct students to write brief descriptions (one or two sentences) that describe as fully as possible their own image of the river. What does it look like? What kind of river is it? How does it compare to rivers students know? Once students have written their descriptions, ask several students to read their descriptions aloud.

6. Tell students that a writer named Philip Fradkin traveled the whole length of the river in the 1960s, shortly after the construction of Glen Canyon Dam. Fradkin wrote a book to describe his journey and also to describe the river. Distribute Handout I, which includes Fradkin's description of the river. Ask students to read the first paragraph, then discuss with students how Fradkin's description compared to their own images of the river.

7. As an assessment activity, form students into groups of four. Inform the class that they will be spending the next several class periods working in groups to design a solution to water issues in the Colorado River Basin. Allow students to complete the reading in Handout I; then ask students to work in groups to develop their plan. Ask students to think carefully about the Colorado River Basin's reliance on the river's water and about the information they have learned in this unit. Students may wish to consult other sources of information, such as those listed in the **Supplemental Resources** section at the beginning of the unit.

Ask students to submit their plans in writing; you may also ask students to present their plans to the class or to post their plans in the classroom so they can be studied by other groups. Discuss the merits of each plan with the class.

Extension/Enrichment:

1. Students may compare issues they have studied about the Colorado River Basin with those of the Nile River Valley. Both the Colorado and the Nile Rivers support desert civilizations. Students may research historical and contemporary human uses of the Nile River to find similarities and differences between the two river basins.

2. Students may research how ancient peoples in the Colorado River Basin used dams and irrigation techniques to support their agriculture and ways of life. A look at the Anasazi people of the Colorado Plateau reveals interesting water control techniques, as well as a mystery: why did they abandon their homes in 1300 AD? Was it because of a severe drought?

3. Recently, draining Lake Powell has been advocated by the Sierra Club and others. Have students investigate the reasons for the Sierra Club's position, as well as the arguments against such an action.

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DAMS ALONG THE COLORADO RIVER: BENEFITS

Flood Control

Historically, the Colorado was a mighty river. In spring, when snow melt in the rugged mountains of Colorado and Wyoming found its way into the river's tributaries, the Colorado roared downstream, cutting through rock in Utah and Arizona and carving out canyons. When settlers began to live along its banks and use its water to irrigate their crops, the river's seasonal floods could cause tremendous damage. One U.S. Bureau of Reclamation employee described the river this way:

> Unharnessed it tore through deserts, flooded fields, and ravaged villages. It drained the water from the mountains and plains, rushed it through sun-baked thirsty lands and dumped it into the Pacific Ocean - a treasure lost forever.

Dams along the river have controlled its flow, allowing farms and communities to make use of its water without living in fear of devastating floods each spring.

Water Storage and Hydroelectric Power

According to the 1922 Colorado River Compact, the upper and lower Colorado River basins are allotted 7.5 million acre-feet of river water per year. But how do the upper basin states ensure that their water stays in the upper basin? In 1963, construction of Glen Canyon Dam was completed. The dam was built to store water for use by the upper basin states; the dam is operated as the main spigot controlling the river's flow into the lower basin. Dam operators release only enough water downstream to live up to the river compact's requirements; the rest of the water is stored in Lake Powell, the reservoir created by the dam. Water stored in Lake Powell remains in the upper basin.

Both Glen Canyon Dam and Hoover Dam produce hydroelectric power for cities such as Phoenix, Las Vegas, and Los Angeles. Water flowing over the dam produces tremendous force that, when exerted on turbines, creates electric current. The revenue from sales of electricity produced at Glen Canyon Dam has helped repay the federal government for the cost of building the dam.

Recreation

Reservoirs created by dams along the Colorado River have become popular recreation sites for millions of vacationers in the Southwest. The 186-mile-long Lake Powell is a favorite boating area for Arizonans seeking a respite from hot, dry summers. Three million people visit the desert lake each year. Vacationers also flock to Lake Mead, just above Hoover Dam, and Lake Havasu, created by Parker Dam, which both offer miles of boating pleasure.

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DAMS ALONG THE COLORADO RIVER: COSTS

Downstream Effects: Sediment and Water Temperature

Dams on the Colorado River have caused tremendous changes in both the flow of the river and in the environment that the river flows through. When dams were built, most people did not think very much about how the dams would affect the river environment downstream. Today, scientists and the public are paying closer attention to this issue.

One major downstream effect of dams such as Glen Canyon Dam has been a change in the amount of sediment (sand and pebbles scoured from rocks upstream) that flows through the river below the dam. Historically, the Colorado River carried a huge amount of sediment; the sediment's abrasive power helped carve the Grand Canyon. Sediment that flowed in the river collected and formed beaches along the canyon that became home to animal and plant species. Glen Canyon Dam halts the flow of much of the river's sediment. Clear, sediment-free water now flows through the canyon. The water does not build up beaches for animal and plant habitat.

The amount of water released through the dam each day depends on the need for electricity in Phoenix and other cities. On hot summer days in Phoenix, demand for air conditioning spikes, meaning increased hydroelectric output at Glen Canyon Dam. On such days, the dam releases increased flows of water to produce power. The sudden change of water flow erodes beach areas in the Grand Canyon. Because of changes in the river's sediment and flow, native plant and animal species may not be able to survive in the new environment below the dam.

Another major downstream effect of dams is a change in the river's water temperature. The water flowing below Glen Canyon Dam is colder today than the water that flowed through the Grand Canyon before the dam was built. This is because water is released from deep within Lake Powell, where it is colder than the lake's surface water. This colder water makes it difficult for some fish species to survive; many fish native to the Colorado River are now endangered.

Lost Beauty

Dams along the river have affected the river environment's natural beauty. When Glen Canyon Dam was proposed in the 1950s, artists, archaeologists, and others flocked to Glen Canyon to take photographs and study ancient petroglyphs and dwellings before they were lost forever to Lake Powell. In 1963, the noted American photographer Eliot Porter published a book of photographs of Glen Canyon entitled *The Place No One Knew*. His photographs demonstrated the stark beauty of the red-rock walled canyon that would soon be filled with millions of gallons of water. In March 1963, Glen Canyon and its extraordinary beauty disappeared from view.

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DAMS ALONG THE COLORADO RIVER: COSTS AND BENEFITS

Benefits:

1.

2.

3.

4.

Costs:

1.

2.

3.

4.

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A River No More

In his book, *A River No More: The Colorado River and the West*, author Philip Fradkin states that the Colorado "resembles more a vast plumbing system than a river." Control of this once-mighty river, he argues, "is the inevitable price that had to be paid for the establishment of an extensive culture in the desert. The problems arise when that civilization believes it can continue to grow until all the water from the river is used...."

Millions of people have moved into the American Southwest in this century, seeking jobs, opportunities, a warm, dry climate, and a breathtaking landscape. People continue to move to this region, and the area's population continues to rise. With more people comes an increased demand for water. How long can the region's population continue to grow? Will the lack of new water resources finally limit the region's growth?

Philip Fradkin believes that the region's desire for water has already exceeded present supplies. "There has to be a realization," he writes, "that the West is at its ultimate limit—meaning there is no more water available—before anything different will happen." In her book, *Rivers in the Desert*, author Margaret Davis writes that the region must find creative solutions to its critical water problems because "there are no more rivers to bring to the desert."

What is next for the Colorado River Basin? Can creative solutions to the basin's water problems be found?

A Colorado River Basin Commission is meeting to decide the future of the Colorado River Basin. Members of the Commission have asked you for your input and advice in designing a water-use plan for the region. Work with your group to design a plan that addresses the following questions:

1. Should the 1922 Colorado River Compact be revised?
2. Should the river basin states meet to create a new river compact?
3. Should the region restrict future population growth so that demand for water will level out?
4. Is it possible to find a solution that allows unlimited population growth and a healthy, living Colorado River?
5. Are more dams needed?
6. Can critical habitat for fish and animals be protected?

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Study Guide for *Downriver*,

By Will Hobbs (New York: Atheneum, 1991)

Summary:

Seven teenagers enrolled in a wilderness education program not-so-affectionately known as "Hoods in the Woods," hijack the leader's equipment and attempt to raft the Colorado River without a map, a permit, or adult assistance. While some days on the river are idyllic, the teens also experience injuries and betrayal by two of their group. The narrator, a 15-year-old girl named Jessie, emerges from the experience with new friends, new confidence, respect for the wilderness, and a willingness to work out the problems with her family.

Initiating Activities:

1. Ask students if they know what *downriver* means; if not, help them develop a definition. Read the dedication page to students. Based on the Roosevelt quotation and the book's title, what do students think the book is about?

2. Have students locate the source of the Colorado River on a U.S. map and describe its location as accurately as possible. With students, trace the river's route through the Grand Canyon to the mouth. Ask them to describe the location of the mouth as accurately as possible.

Discussion Questions:

(After reading Chapters 1-4)

1. Where are the San Juan Mountains? What do you think the weather in October would be like in the San Juans? On what do you base your answer? What challenges would the weather pose in climbing a mountain, such as Storm King Peak?

2. What do you think Al meant when he said society lacks a ritual by which "young people can decisively achieve adulthood"? Can you think of any examples of such rituals, either in this culture or another? Do you think such rituals are important? Why or why not?

3. Describe what happened on Storm King. What caused the problems? Who do you think was responsible?

4. After the problems on Storm King, Freddy was friendlier toward Jessie. How did she respond? Why do you think she rejected his overtures? What feelings do you think she was having at the time?

5. Describe the eight teenagers on the "Discovery Unlimited" program. Try to predict some of the problems they may face as a group. Which teens do you think might be the cause of the problems?

From *G Is for Geography: Children's Literature and the Five Themes* (Boulder, CO: SSEC, 1993).

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Who do you think is most likely to "blow the whistle"? Which of the eight would you most like to be friends with? Least like to be friends with? Why?

(After reading Chapters 5-9)

6. Trace the group's route from where they left Westwater Canyon to where the teens left Al. Describe the scenery they saw on the drive.

7. Describe what Troy did in the convenience store. Why do you think he did it? How might you explain the different reactions to his offer to buy everyone whatever they wanted? How would you react to such an offer?

8. Why do you think the teenagers decided to drive off without Al? If they had seen Al walking across the parking lot just as they were starting the van, do you think they still would have gone? Do you think they would have gone if one of the kids had made a strong argument against going? Why do you think they decided to raft down the Colorado River instead of going to one of the other places that was suggested?

9. Find Lee's Ferry, Arizona, on a map. How accurate was the group's estimate that they would travel 200 miles between there and Lake Mead? Do you think traveling 20 miles a day is reasonable? Why or why not?

10. Describe some of the problems the group had in their first two days on the river. What skills helped them solve these problems? What could they have done to avoid the problems?

(After reading Chapters 10-13)

11. Why do you think the water in the side canyon the group explored was so much warmer than the water in the Colorado?

12. What did Jessie learn about Freddie when they found the Hopi shrine? Does this information help you better understand Freddie and some of his actions? Explain your answer.

13. What did the mile-by-mile guide contain that kept Jessie up reading it at night? How did all the information make her feel? Why do you think Troy threw the guide away? If you had been with the group, what would you have done after Troy threw the guide away? Why do you think Jessie continued being friendly with Troy?

14. Why did Jessie tell Star things like she had "pudding in her head"? Do you agree with Jessie? How might you account for Star's behavior?

(After reading Chapters 14-17)

15. Describe the conflict over what to do at Crystal. Which side had the better arguments? Why couldn't the others be convinced?

16. What health problems did the group develop near the end of the book? Who or what do you think was responsible for these problems?

17. After Al picked up the kids, Rita looked at Lava Falls from the helicopter and said she still thought they could have "kicked its butt." Do you agree? Why or why not?

18. Imagine that it is four months later. What do you think Jessie and her friends will be doing?

(After reading Chapter 18)

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19. How accurate were your predictions? How much of the change in group members' lives do you think was attributable to their experience on the river? Explain your answer.

Follow-up Activities:

1. The book referred to several ways in which flashfloods affected the river. Ask students to draw pictures that illustrate how a flashflood could change the river in some way.

2. Encourage students to write a journal or diary of the trip on the river from the standpoint of a character other than Jessie. The journal should describe the character's reaction to events, as well as the physical surroundings.

3. If possible, obtain a mile-by-mile guide of the Colorado River and allow students to explore it, learning more about the awesome power of the river and the beauty of its surroundings. Interested students could create a large wall map of the river's course, showing the various side canyons and rapids that the group encountered.

4. Will Hobbs has experienced all of the adventures he includes in his books. Students could write to him in care of the publishing company to ask questions about rafting that the book prompted.

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